From:	Ohrel, Sara
To:	Baker, Justin
CC:	Beach, Robert H.; Cole, Jefferson; Latta, Greg
Sent:	1/17/2014 1:24:27 PM
Subject:	process based appendicx
Attachments:	Appendix F process attributes 12 18 13 itt minor comments - JC Edits.docx

Hi Justin,
You can pull process terms from this appendix. I will be in touch soon about specifics.

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Cole, Jefferson
To: Baker, Justin; Ohrel, Sara
Sent: 1/14/2014 6:19:11 PM
Subject: RE: FABA Baseline construction App I 01 14 2014docx.docx
Attachments: FABA Baseline construction App I 01 14 2014 - Edits JC.docx

Sara and Justin,

Thanks Justin for the revised version. I've gone through and made a few edits. Mostly, I've done editing on formatting and spacing to make things good for management review as the appendix stands now.

A few notes:

Ex. 5 - Deliberative

- We are still missing references in the section at the end.
- A few of the graphics still need adjusting. Do we have the spreadsheet for that? If so, they should all be a relatively straightforward and easy fix.

See you both tomorrow,

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Baker, Justin [mailto:justinbaker@rti.org]
Sent: Tuesday, January 14, 2014 11:55 AM
To: Ohrel, Sara; Cole, Jefferson
Subject: FABA Baseline construction App I 01 14 2014docx.docx

Sara and Jeff,

Here is the latest. I did not do much. It's in good shape. Needs references, but I wasn't sure if these go with each appendix, or at the end of the whole document (also, I'm not sure how ICF wants to format citations).

I'm having a little trouble revising Figure 1 on page 3. Should we keep as is for now as it goes to Paul, or should I work more on the figure today?

Thanks,
Justin

From: Cole, Jefferson
To: Ohrel, Sara; Jenkins, Jennifer
Sent: 1/14/2014 4:07:37 PM
Subject: RE: draft PPT
Attachments: Biomass update for Sarah 1 15 2014 v6 so jc.pptx

Sara,

Thanks for taking a sharp cleaver to my draft and cooking up an even better PPT. I've made a few edits to the tables on slides 6 and 7 and also tried my hand at inserting some text on slide 9. My additions are in blue.

Jen, you're at bat!

Jeff

_____

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Tuesday, January 14, 2014 2:42 PM
To: Cole, Jefferson; Jenkins, Jennifer
Subject: draft PPT

Hi crew,
I haven't finished updating yet (still need to address the end of slide 9 and rework 11), but wanted to get your initial feedback, especially on the presentation of green and blue feedstock tables (slides 6,7).
Jeff you are up next, then Jen if she can take a look before the end of the day today/in the am tomorrow. I would like to have your edits/suggestions by 2:30 pm tomorrow so I can download them and finish updating on the train tomorrow night and then send to Allen and Bill for their review tomorrow night when I get home.
Thnaks!

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Jenkins, Jennifer
To:	Ohrel, Sara
CC:	Cole, Jefferson
Sent:	1/14/2014 11:09:55 AM
Subject:	Fw: App F: needs some attention
Attachments:	Appendix F process attributes 12 18 13 itt minor comments - JC Edits.docx

---

From: Cole, Jefferson
Sent: Friday, January 10, 2014 4:43:08 PM
To: Jenkins, Jennifer
Cc: Ohrel, Sara
Subject: App F: needs some attention

Jen,

I've been looking quickly through F, and there are a couple things to note.

First, not all of the technical team's comments/suggestions have been addressed by ICF. They were simply included. No fixes/edits have been made by ICF to correct them. Nothing major, just important to note. There are a couple good suggestions in there.

Ex. 5 - Deliberative

I've attached a moderately edited version for you to combine with F.

As an aside, I will have my work laptop with me this weekend and will be cranking on my list of tasks. I should be able to be gotten hold of if you guys need to contact me.

Jeff

--Deliberative--

_____

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From:	Ohrel, Sara
To:	Cole, Jefferson; Jenkins, Jennifer; Jennifer Jenkins
Sent:	1/14/2014 10:56:20 AM
Subject:	is this the latest version of F?
Attachments:	Appendix F process attributes 12 18 13 itt minor comments.docx

Please let me know if this is the latest version of F.

Jeff: FYI – we are sending E and F to Allen today as separate documents as they are not merged. Jen will merge them tomorrow.

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Cole, Jefferson
To: Ohrel, Sara
CC: Jenkins, Jennifer
Sent: 1/13/2014 3:24:41 PM
Subject: Briefing - New Version
Attachments: Biomass update for Sarah 1 15 2014 v6.pptx

Sara (you're next) and Jen,

I've made a few edits to the version that was sent around this morning. My deletions are in ~~red~~ and my additions are in blue. Comments/annotations throughout.

The changes I made:

Ex. 5 - Deliberative

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Cole, Jefferson
To: Ohrel, Sara; Jenkins, Jennifer
Sent: 1/10/2014 3:11:18 PM
Subject: RE: your review needed on PPT
Attachments: Biomass update for Sarah 1 13 2014 v2 JC so jcj JC.pptx

Sara,

My changes are below, but I've also attached my edited version of the PPT.

1. On slide 6, **Ex. 5 - Deliberative** We should have our answer ready.
2. I adjusted the font size (15 to 14) on the first results slide to show the slide number. Added a little title on the second results slide and aligned both tables to center.

--Deliberative--

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Friday, January 10, 2014 2:53 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: your review needed on PPT
Importance: High

My edits in green. And I totally revamped how results are presented.
Please send comments no later then 330pm. I will send to bill and allen as soon as possible after that time.

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Cole, Jefferson
To:	Jenkins, Jennifer; Ohrel, Sara
Sent:	1/10/2014 12:38:41 PM
Subject:	RE: immediate task list and case studies apps outline -deliberative
Attachments:	Biomass update for Sarah 1 13 2014 v2 - JC Edits.pptx

Jen, thanks for sending this and applying all of Bill's comments.

Per Suzie's comments, I focused on cleanup of the ppt, and also added a simple table for the results. Sara, I'll leave it to you to populate it.

Overall, I think it looks good so far.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
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cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Thursday, January 09, 2014 4:14 PM
To: Cole, Jefferson; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

Cool. Here is the updated ppt.

From: Cole, Jefferson
Sent: Thursday, January 09, 2014 4:01 PM
To: Jenkins, Jennifer; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

Sounds good. I won't have it ready in 15 mins. Just put in a placeholder and I will send it tonight.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
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cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Thursday, January 09, 2014 4:00 PM
To: Cole, Jefferson; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

Yes please. I am working on certification now but I do have to leave at 4:15 for another meeting. So if you finish it after I take off, I'll just include a placeholder slide for it in this version of the ppt. Otherwise the ppt is all ready to go.

From: Cole, Jefferson
Sent: Thursday, January 09, 2014 3:59 PM
To: Jenkins, Jennifer; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

Just spoke with Allen. Let's go ahead and keep the results in the ppt. Perhaps just scenarios and BAF numbers. Also, we will have the results doc for backup/more detail.

I am working on the results doc now. Would you like me to send you a version to include in the PPT?

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
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cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Thursday, January 09, 2014 3:46 PM
To: Cole, Jefferson; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

OK, so where Suzie requests a simple table with results, I should replace the text & her comment with "see handout?"

From: Cole, Jefferson
Sent: Thursday, January 09, 2014 3:45 PM
To: Jenkins, Jennifer; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

We are going to keep the results in the results document, not in the briefing, per Allen's request when we were talking earlier. The results document will be discussed alongside the rest of the briefing material.

Jefferson Cole
Climate Economics Branch
Climate Change Division
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cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Thursday, January 09, 2014 3:43 PM
To: Cole, Jefferson; Ohrel, Sara
Subject: RE: immediate task list and case studies apps outline -deliberative

Question:

Do we have any feedback from Allen/ Suzie/ Bill on whether or not to put the results in the briefing itself? Suzie put in a placeholder for a couple of slides along those lines, but I know Allen had given us some feedback on the results document (from which those results would be pulled, right?).

From: Cole, Jefferson
Sent: Thursday, January 09, 2014 3:29 PM
To: Ohrel, Sara; Jenkins, Jennifer
Subject: RE: immediate task list and case studies apps outline -deliberative

Sara,

Thanks a ton for sending this. I was literally drafting an email requesting this. Nice mind meld.

Jen, when are you going to be getting to combining E and F? I had on my list to quickly review F as it is now. As of now, I am planning on doing that tomorrow afternoon.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Thursday, January 09, 2014 3:27 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: immediate task list and case studies apps outline -deliberative

Good meeting team!

Tasks:

Ex. 5 - Deliberative

Sara Bushey Ohrel

Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Flugge, Mark
To:	Jenkins, Jennifer; Ohrel, Sara
CC:	Sherry, Christopher; Cole, Jefferson; Riley-Gilbert, Marybeth
Sent:	1/9/2014 1:48:57 PM
Subject:	(EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 1) Revised main report text
Attachments:	AF2 main body TCD 1 6 14_MERGE RBandITT_ICF_01-09-2014.docx

Hi Sara: please find attached the revised version of the main body text including the updated Glossary (and adding some missing citations/references) for TO 003: *Revisions to Accounting Framework for GHG Emissions from Bioenergy and Other Biogenic Sources*.

Best regards,
Mark and Marybeth

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From: Ohrel, Sara [mailto:Ohrel.Sara@epa.gov]
Sent: Wednesday, January 08, 2014 6:32 PM
To: Flugge, Mark
Cc: Jenkins, Jennifer; Cole, Jefferson
Subject: Merged AF2 main doc draft - deliberative

Hi Mark,

Today we had discussed that I would do one merge (OTAQ and old comments from Robert Beach) and then hand off to ICF for another merge with ITT commented version and addition of the updated glossary. However, I actually did both merges so we do not need ICF to do that. All we now need from ICF is the addition of the updated glossary.

Being that we had set a delivery date for Friday am for the merge and glossary addition, now that we only need ICF to do the glossary update, **please send us the attached draft AF2 document with the updated glossary no later than 3pm tomorrow, Thursday 1/9/14.** This way I can review the entire updated main doc draft on the train tomorrow (I need to leave soon after 3pm). Please send an email confirming receipt of this revised deliverable.

Thank you,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
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Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Cole, Jefferson; Jenkins, Jennifer; Sherry, Christopher
Sent:	1/6/2014 4:58:25 PM
Subject:	RE: briefing for Paul and Sarah
Attachments:	Update on Biomass for Sarah 1_6_2014_JC SO.pptx

Hi team,
I had a few comments and one edit in orange (toward end of main slide deck).

From: Cole, Jefferson
Sent: Monday, January 06, 2014 4:17 PM
To: Jenkins, Jennifer; Ohrel, Sara; Sherry, Christopher
Subject: RE: briefing for Paul and Sarah

Folks,

Thanks for sending this, Jen.

I have a few comments/edits which I've included in the revised attachment. Nothing big, but regarding the last slide before the appendix, shouldn't we have the process in your comment bubble spelled out as an option? Also, I re-arranged the feedstock table. I also added cubicle walls and broken office chairs as potential feedstocks.

Jeff

Jefferson Cole
Climate Economics Branch
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cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Monday, January 06, 2014 3:07 PM
To: Ohrel, Sara; Cole, Jefferson; Sherry, Christopher
Subject: briefing for Paul and Sarah

Team Biomass:

In preparation for the pre-brief with Paul (Thursday) and the briefing with Sarah (Monday), I am attaching a revived version of the slide deck we put together for the Briefing With Sarah That Wasn't back in December.

I took the version that Sara sent around on December 9 (that had already been edited by Bill & Suzie), accepted all of the changes, then added some comments and substituted the new "feedstock" table that OAQPS used for the Administrator briefing on Dec 19 (the one with green & blue rows).

Suzie and Bill want to see a draft of this by Tuesday COB. Please take a look, see what you think, and we'll forward to them tomorrow. I suggest we not spend too much time tweaking this version before they see it again, because it seems possible that our message with this briefing has changed in ways we are not fully aware of. Specifically: we need to give an update to Sarah about AF2, but at this point, since the Administrator weighed in the week before Christmas, we may not need her to make decisions. This briefing may just be informational. But let's see what Bill/ Suzie/ Allen have to say.

Thanks and talk tomorrow
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Ohrel, Sara
To:	Ohrel, Sara
Sent:	1/2/2014 3:21:09 PM
Subject:	FW: (EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Consolidated comments for technical documentation
Attachments:	Appendix F process attributes 12 18 13 itt minor comments.docx; Appendix G RP CS 12 18 13 ITT comments.docx; Appendix I Faba baseline 12 18 13 ITT comments.docx; Appendix K waste 12 18 13 ITT one comment.docx; Appendix L leakage 12 18 13 itt_comment.docx; Appendix M 12 18 13 itt no comment.docx

From: Ohrel, Sara
Sent: Wednesday, December 18, 2013 4:47 PM
To: 'Flugge, Mark'; Jenkins, Jennifer
Cc: Sherry, Christopher; Cole, Jefferson; Biggar, Sarah; Riley-Gilbert, Marybeth; Steele, Rachel
Subject: RE: (EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Consolidated comments for technical documentation

Here are the remaining appendices F-M broken out into individual documents.

From: Flugge, Mark [mailto:Mark.Flugge@icfi.com]
Sent: Wednesday, December 18, 2013 3:45 PM
To: Jenkins, Jennifer
Cc: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson; Biggar, Sarah; Riley-Gilbert, Marybeth; Steele, Rachel
Subject: (EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Consolidated comments for technical documentation

Hi Jen: please find attached the consolidated comments files for the technical documentation including the comments from Gregg Marland, Thomas Buchholz, and Neil Sampson for TO 003: *Revisions to Accounting Framework for GHG Emissions from Bioenergy and Other Biogenic Sources*.

Please note that there were no comments from the technical team for Appendix A: *IPCC Approach to Accounting for All Anthropogenic Greenhouse Gas Emissions*.

Best regards,
Mark

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Connect with us on social media.

From: Cole, Jefferson
To: Ohrel, Sara; Jenkins, Jennifer
Sent: 1/2/2014 5:48:52 PM
Subject: RE: task list for team biomass
Attachments: Appendix M - Secondary Feedstocks - Edits JC.docx; team biomass tasks 1 2 14 - JC.docx

Thanks as always for keeping us organized, Sara!

I've attached a new version of Appendix M: Secondary Feedstocks.

As we've discussed, I've Ex. 5 - Deliberative

Overall comment: Ex. 5 - Deliberative

Ex. 5 - Deliberative

Can one of you two look at this for a final go 'round?

Also, I've updated slightly the document you sent, Sara.

- J

--Though it should be obvious and evident from its content and context, this email is deliberative. Just to be clear.--

_____

Jefferson Cole
Climate Economics Branch
Climate Change Division
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cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Thursday, January 02, 2014 3:35 PM
To: Cole, Jefferson; Jenkins, Jennifer
Subject: FW: task list for team biomass

Sorry, sent to Jeff's gmail by accident

From: Ohrel, Sara
Sent: Thursday, January 02, 2014 3:34 PM
To: Jenkins, Jennifer; 'Jefferson Cole'
Subject: task list for team biomass

Hi all,
Attached I have updated the list of tasks from 12/17, and added a chart at the bottom with to-dos/due dates. Please update the tasks/chart as needed, as I wasn't sure where everything stood. I am trying to address version control to make sure that we are working off the correct documents.
Happy new year,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division

U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Latta, Greg; Justin Baker (justinbaker@rti.org)
CC:	Cole, Jefferson; Beach, Robert H.
Sent:	12/31/2013 3:52:16 PM
Subject:	table of contents for all FABA appendices
Attachments:	Appendix H 12 31 13 v2_FASOM details cut.docx; Appendix J FABA 3CS tearing apart 5_12 31 13v2 wFGHGdetail.docx; FABA Baseline construction App I 12 31 13.docx

Hi team,
Attached you will a document that has a proposed table of contents for the FABA appendices (at the bottom of the same document, you will find a current table of contents for your reference). It seems that we should Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative I have already moved it (but have versions without it in case we hear a vote of dissent to this proposal).
Also, for prosperity sake, I am sending along the latest versions of all FABA apps: H (background), I (baseline construction) and J (CS). No marching orders on these yet, but those will come Thursday.
Thanks, and have a great New Year!
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Jenkins, Jennifer; Cole, Jefferson
Sent: 12/16/2013 5:41:05 PM
Subject: RE: following up
Attachments: Certification one pager v2.docx

As far as I have gotten. We have a guest coming by at 6pm so no more from me now. I expect something from RTI this eve, and can include their stuff during my train ride in tomorrow am.

From: Jenkins, Jennifer
Sent: Monday, December 16, 2013 3:32 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: RE: following up

On certification, this was the topic of the meeting in Savannah (at least as it relates to EU/ UK policy, since they are considering it seriously). I wonder if we need to **Ex. 5 - Deliberative** Ex. 5 - Deliberative Just a thought.

Also, Suzie did not seem to mention **Ex. 5 - Deliberative** **Ex. 5 - Deliberative** Can we have RTI add a bullet on each of those? I believe Chris included them in the original memo.

From: Ohrel, Sara
Sent: Monday, December 16, 2013 3:03 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: following up

Thanks. Jeff, for version control, please review BL piece first, then I will. Almost done with skeleton of certification piece.

From: Jenkins, Jennifer
Sent: Monday, December 16, 2013 3:01 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: RE: following up

Attached is the piece on black liquor for your review.

No word back from Vera yet.

BL meeting changed to 9 am tomorrow.

Will now start on feedstock list.

Jen

From: Ohrel, Sara
Sent: Monday, December 16, 2013 2:38 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: following up

You got it

From: Jenkins, Jennifer
Sent: Monday, December 16, 2013 2:35 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: following up

OK, following up on the call with Suzie just now:

In the next hour, I will:
Reschedule the BL meeting for tomorrow (morning)
Call Vera to ask about plans for the Gina briefing
Write up 4 black liquor bullets
Edit the feedstock table with the "Elliot Plan" stuff

Sara will:
Write up the certification one-pager, working with RTI/ whomever to get the required info

Tomorrow morning, we will:
Provide drafts of the BL bullets and certification one-pagers to Bill/ Allen/ Suzie

Did I miss anything?

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
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202-343-9361
jenkins.jennifer@epa.gov

From:	Ohrel, Sara
To:	Flugge, Mark
CC:	Jenkins, Jennifer; Cole, Jefferson
Sent:	12/16/2013 3:56:14 PM
Subject:	FW: AF2 Main Document
Attachments:	AF2 main body 12 5 13 clean with comments.docx

Hi Mark,
As discussed as part of the comments consolidation effort, attached is our recent AF2 main document.
Thanks again,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Jenkins, Jennifer
To: Ohrel, Sara; Cole, Jefferson
Sent: 12/16/2013 1:57:47 PM
Subject: RE: recent Team Biomass tasks - pls review and edit as needed

Got it. I won't have time for this today, on top of business planning and Branch meeting. Do you? Jeff?

If not I suggest we go with RTI/ Galik. Can't we just send him Suzie's instructions? They seem detailed enough to me. I do have time for a phone call if that's what would be needed.

From: Ohrel, Sara
Sent: Monday, December 16, 2013 1:55 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: recent Team Biomass tasks - pls review and edit as needed

Us. No time for giving instructions, review etc even if Galik had time. If any contractor, I would ask RTI

From: Jenkins, Jennifer
Sent: Monday, December 16, 2013 1:52 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: RE: recent Team Biomass tasks - pls review and edit as needed

Thanks Sara –

Recommend that who take a crack at it? ICF?

From: Ohrel, Sara
Sent: Monday, December 16, 2013 1:49 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: recent Team Biomass tasks - pls review and edit as needed

Hi,
I would recommend that take a crack it and have RTI help with getting the state program data (Robert with help from TJ or someone else). Ex. 5 - Deliberative

Ex. 5 - Deliberative

From: Jenkins, Jennifer
Sent: Monday, December 16, 2013 11:08 AM
To: Ohrel, Sara; Cole, Jefferson
Subject: RE: recent Team Biomass tasks - pls review and edit as needed

Hey –

We haven't talked about how to accomplish this certification one-pager by tomorrow… sorry for not picking it up sooner. What are we thinking? Can we ask Galik to write it up for us?

Ex. 5 - Deliberative

Ex. 5 - Deliberative

From: Ohrel, Sara
Sent: Friday, December 13, 2013 10:48 AM
To: Jenkins, Jennifer; Cole, Jefferson
Cc: Kocchi, Suzanne; Irving, Bill
Subject: recent Team Biomass tasks - pls review and edit as needed

Tasks & Reminders as derived from recent emails: 12/12/13

- Use updated feedstock table from Suzie in 12/12 document

Forest certification

- **Sarah would like a ½ pager to a one pager that contains the following info (draft by Tue 12/17)**

Ex. 5 - Deliberative

"Elliott plan"

- 12/11 email from Suzie to Sara per the "Elliott plan": Paul wants you guys to

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Beach, Robert H.
To:	Ohrel, Sara
CC:	Baker, Justin; Cole, Jefferson; greg.latta@oregonstate.edu
Sent:	12/12/2013 3:17:16 PM
Subject:	RE: CONFIRMED: Conference call to discuss conducting sensitivity analyses for terms in the BAF equation
Attachments:	Baseline construction and comparison App 10 25 2013_v12213_rhb.docx

Sara,

A couple things came up unexpectedly yesterday afternoon that delayed me finishing my comments on the baseline construction file, but here are my comments on that file. Just let me know if you have any questions.

Best,
Robert

From: Ohrel, Sara [mailto:Ohrel.Sara@epa.gov]
Sent: Thursday, December 05, 2013 9:20 AM
To: Beach, Robert H.
Cc: Baker, Justin; Cole, Jefferson
Subject: FW: CONFIRMED: Conference call to discuss conducting sensitivity analyses for terms in the BAF equation

Happy reading Robert J

From: Ohrel, Sara
To: Jenkins, Jennifer; Cole, Jefferson
Sent: 12/12/2013 6:44:28 AM
Subject: Re: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Thanks, that works. I am free from 11am-12pm.

From: Jenkins, Jennifer
Sent: Wednesday, December 11, 2013 8:20:03 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: Re: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Sure. Flight is at 9 am Pacific. I can probably chat once I get to the gate, 830 ish. Does that work for you?

From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 6:50:38 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: Re: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

We can speak tomorrow am about this if we need to get back to Steve asap. What time can you chat?

From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 6:36:37 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Ex. 5 - Deliberative

From: Jenkins, Jennifer
Sent: Wednesday, December 11, 2013 6:28 PM
To: Cole, Jefferson; Ohrel, Sara
Subject: Re: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Thanks --

Agree that we don't have a lot of time. Intent was not to **Ex. 5 - Deliberative**

Ex. 5 - Deliberative

This should be quick: just fill in what you are planning to do for FABA, circulate amongst us so we can agree, then we give direction to ICF/ RTI.

I am hoping we can get TD on at least some of this for RP to Steve by tomorrow so he can start working, because

last week we asked him to set aside Thurs and Fri this week to do the analysis. We had originally asked them to be done with the whole thing, including writing, by Friday!

Jen

From: Cole, Jefferson
Sent: Wednesday, December 11, 2013 2:05:01 PM
To: Ohrel, Sara; Jenkins, Jennifer
Subject: RE: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Just to chime in here.

In terms of next steps, I am tending to agree with Sara (and your latter proposal, Jen). I like the detailed spreadsheet that Mark sent out, but I think it would be best to Ex. 5 - Deliberative

Ex. 5 - Deliberative

Only then, after we've made our decision, should we go back to our contractors with specifics.

We need to get this done quickly. We are not giving them a lot of space for writing at this point, so we really need to keep that in mind. As of now, it looks like we're only going to be able to provide one round of feedback, and that will be tight as it is.

Jen, are you okay with this? If so, Sara and I can coordinate with RTI using this latest spreadsheet from Mark and have something to discuss amongst ourselves hopefully very soon.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 1:51 PM
To: Jenkins, Jennifer; Cole, Jefferson
Subject: RE: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

I am confused and frankly rather frustrated. This chart, as described by Mark in his email, was to Ex. 5 - Deliberative

Ex. 5 - Deliberative

From: Jenkins, Jennifer
Sent: Wednesday, December 11, 2013 1:41 PM
To: Ohrel, Sara; Cole, Jefferson
Subject: Fw: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Do you think it's safe to have the ITT do the analyses here (ie will they be consistent with what you will do for FABA) or should we fill in the matrix with FABA pieces first, before we give TD to ICF?

From: Flugge, Mark <Mark.Flugge@icfi.com>
Sent: Wednesday, December 11, 2013 12:02:33 PM
To: Jenkins, Jennifer
Cc: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson; Steele, Rachel; Riley-Gilbert, Marybeth; Biggar, Sarah
Subject: EP-B12H-00125/TO 003: Sensitivity Analysis Matrix

Hi Jen: please find attached the sensitivity analysis matrix in Excel including your suggested edits and additional notes.

I hope that this will be useful in finalizing the technical direction for the sensitivity analyses for the RP team—I would like to share that TD with Steve and Thomas as soon as possible.

Best regards,
Mark

From: Jenkins, Jennifer [mailto:Jenkins.Jennifer@epa.gov]
Sent: Tuesday, December 10, 2013 5:13 PM
To: Flugge, Mark
Cc: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson; Biggar, Sarah; Riley-Gilbert, Marybeth; Steele, Rachel
Subject: Re: EP-B12H-00125/TO 003: discussion items for Friday (September 11) project management meeting

Thanks Mark --

This is helpful. Can you please turn it into a spreadsheet so we can share and edit amongst the FABA and RP teams?

I am on blackberry so will add some edits here in text:

Ex. 5 - Deliberative

Please add a column to the spreadsheet for "notes" for each baseline and explain a bit about how we plan to carry out the analysis

Thanks!
Jen

From: Flugge, Mark <Mark.Flugge@icfi.com>
Sent: Monday, December 09, 2013 8:37:06 AM
To: Jenkins, Jennifer
Cc: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson; Biggar, Sarah; Riley-Gilbert, Marybeth; Steele, Rachel
Subject: RE: EP-B12H-00125/TO 003: discussion items for Friday (September 11) project management meeting

Hi Jen: as requested, please find attached a matrix indicating the Ex. 5 - Deliberative

Ex. 5 - Deliberative

Best regards,
Mark

Ex. 5 - Deliberative

Ex. 5 - Deliberative

From: Flugge, Mark
Sent: Friday, December 06, 2013 3:33 PM
To: Jen Jenkins (Jenkins.Jennifer@epa.gov)
Cc: Sara Ohrel (Ohrel.Sara@epa.gov); Chris Sherry (Sherry.Chris@epa.gov); Jefferson Cole (Cole.Jefferson@epa.gov)
Subject: EP-B12H-00125/TO 003: discussion items for Friday (September 11) project management meeting

Hi: please see below for the discussion items I have for our project management meeting today (Friday) at 3:30 pm EST.

§ Proposed schedule/activities:

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

MARK FLUGGE | Manager | 202.862.1231 (o) | Mark.Flugge@icfi.com | icfi.com
ICF INTERNATIONAL | 1725 I Street NW, Suite 1000, Washington, DC 20006 | 202.862.1144 (f)
Connect with us on social media.

From: Ohrel, Sara
To: Kocchi, Suzanne
Sent: 12/11/2013 3:03:26 PM
Subject: RE: Black liquor etc

Ok, that is very doable. We will add it to our schedule. Thanks for explaining it to me (I missed that in all the emails).

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 3:02 PM
To: Ohrel, Sara
Subject: RE: Black liquor etc

Paul wants you guys to Ex. 5 - Deliberative

Ex. 5 - Deliberative

He is definitely going to want it early next year by the time you brief him next on the case study results.

-----Original Message-----
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 2:57 PM
To: Kocchi, Suzanne
Subject: RE: Black liquor etc

Understood. I can get started on it.
Also, sorry if I missed something, but what is the "Elliott exercise" per Bill's email?

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 2:56 PM
To: Ohrel, Sara
Subject: RE: Black liquor etc

Yea of course, but I think it is important we nail it down. I guess it would actually be 4

Ex. 5 - Deliberative

Ex. 5 - Deliberative

The thing we need to explain is Ex. 5 - Deliberative

Ex. 5 - Deliberative

-----Original Message-----
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 2:51 PM
To: Kocchi, Suzanne
Subject: RE: Black liquor etc

Ah, ok. I stopped on that due to Bill's email.

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 2:42 PM
To: Ohrel, Sara
Subject: RE: Black liquor etc

I think we still need those 3 bullets I mentioned in the other email (the short hand below is ok for Bill but it is still not super user friendly). If we get 3 bullets you guys craft that are technically sound but still simple we can pass them around and start talking in that way

to make sure everyone - in particular OAQPS, OGC and Joe understands them.

-----Original Message-----
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 2:12 PM
To: Irving, Bill; Kocchi, Suzanne; Jenkins, Jennifer; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

Exactly, Bill.

One clarification Ex. 5 - Deliberative

Ex. 5 - Deliberative

FYI - From AF&PA public comments:
-Emissions from mill residues should be considered inherently carbon neutral and have a BAF of 0.
-Emissions from logging residues should not be discounted by a decay function and also should have a BAF of 0.
- (different page): BAF for Mill Residues and Byproducts should be zero

-----Original Message-----
From: Irving, Bill
Sent: Wednesday, December 11, 2013 1:59 PM
To: Ohrel, Sara; Kocchi, Suzanne; Jenkins, Jennifer; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: Re: Black liquor etc

Thanks. At the most general level, let me know if the following is correct;

AFPA cares about 1) BL, 2) use of offsite logging residues, and 3) use of onsite non BL mill residues.

Ex. 5 - Deliberative

_____
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 1:42:09 PM
To: Kocchi, Suzanne; Irving, Bill; Jenkins, Jennifer; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

One friendly amendment below: Ex. 5 - Deliberative
Ex. 5 - Deliberative

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 1:30 PM
To: Irving, Bill; Jenkins, Jennifer; Ohrel, Sara; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

The way Sara Ohrel described it the other day, I found useful. She said Ex. 5 - Deliberative

Ex. 5 - Deliberative

-----Original Message-----
From: Irving, Bill
Sent: Wednesday, December 11, 2013 1:24 PM
To: Jenkins, Jennifer; Ohrel, Sara; Cole, Jefferson
Cc: Kocchi, Suzanne; Fawcett, Allen; Sherry, Christopher
Subject: Black liquor etc

In my general with Paul he was concerned that he didn't understand Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative What should the 30 second summary be?

Also, for discussion at the next biomass team mtg, he expressed an interest in Ex. 5 - Deliberative

Ex. 5 - Deliberative

From:	Flugge, Mark
To:	Ohrel, Sara; Cole, Jefferson
Sent:	12/11/2013 5:28:36 PM
Subject:	FW: Comments on AF2
Attachments:	AF2 main body 9 23 2013 RNS comments.docx; AF2_Technical Documentation_09-23-13_RNS comments.docx; General comments on AF2.docx

FYI

From: Neil Sampson [mailto:neil@visionforestry.com]
Sent: Friday, October 25, 2013 3:05 PM
To: Jenkins.Jennifer@epamail.epa.gov; Flugge, Mark
Subject: Comments on AF2

Hi Jen-
Here's my comments. Hope you had less trouble getting back into this after the two-week break than I did!! It took me a while to get back up to speed.

Basic message – this draft is a real improvement. Congratulations. I caught a few things, and take significant exception to Appendix K, but overall, not much to say at this point.

Hope your presentations go smoothly. Neil

From: Kocchi, Suzanne
To: Ohrel, Sara
Sent: 12/11/2013 1:56:00 PM
Subject: RE: Black liquor etc

Good call. So we need Ex. 5 - Deliberative

Ex. 5 - Deliberative

Want to take a first stab and circulate to the group so we can just this to Paul quick so he understands? He will need to be articulating this to Sarah (and Joe etc) possibly as early as Fri if it comes up at Janet briefing (although I would be surprised if it does).

-----Original Message-----
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 1:52 PM
To: Kocchi, Suzanne
Subject: RE: Black liquor etc

I figured that, just thought others would get confused :)

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 1:50 PM
To: Ohrel, Sara; Irving, Bill; Jenkins, Jennifer; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

Yes that is what I meant, Ex. 5 - Deliberative Thx.

-----Original Message-----
From: Ohrel, Sara
Sent: Wednesday, December 11, 2013 1:42 PM
To: Kocchi, Suzanne; Irving, Bill; Jenkins, Jennifer; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

One friendly amendment below: Ex. 5 - Deliberative
Ex. 5 - Deliberative

-----Original Message-----
From: Kocchi, Suzanne
Sent: Wednesday, December 11, 2013 1:30 PM
To: Irving, Bill; Jenkins, Jennifer; Ohrel, Sara; Cole, Jefferson
Cc: Fawcett, Allen; Sherry, Christopher
Subject: RE: Black liquor etc

The way Sara Ohrel described it the other day, I found useful. She said that Ex. 5 - Deliberative

Ex. 5 - Deliberative

-----Original Message-----
From: Irving, Bill
Sent: Wednesday, December 11, 2013 1:24 PM
To: Jenkins, Jennifer; Ohrel, Sara; Cole, Jefferson
Cc: Kocchi, Suzanne; Fawcett, Allen; Sherry, Christopher
Subject: Black liquor etc

In my general with Paul he was concerned that he didn't understand Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative What should the 30 second summary be?

Also, for discussion at the next biomass team mtg, he expressed an interest in Ex. 5 - Deliberative

Ex. 5 - Deliberative

From: Ohrel, Sara
To: Jenkins, Jennifer; Cole, Jefferson
Sent: 12/5/2013 9:16:38 PM
Subject: main doc
Attachments: AF2 main body 9.23.2013 clean with comments SO.docx

Here it is with some of my comments. We will need to edit/update Ex. 5 - Deliberative But for now, we can send it along to OTAQ (the comments note that we need to edit more).

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Baker, Justin
CC:	greg.latta@oregonstate.edu; 'Beach, Robert H.'
Sent:	12/4/2013 1:20:20 PM
Subject:	RE: today's call
Attachments:	AF2_Appendix G_09-20-2013_tracked changes jcj.docx; TO 003_REVISED DRAFT_Appendix C_09-03-2013 jcj SO.docx

Hi all,
Here are 2 components from the other team on reference point: appendix C on landscape attributes (their GROW and SINTETNC calcs) and app G, how they then calc the BAF. THESE ARE ROUGH – feel free to accept changes if it makes reading easier. But at least it gives you a sense of how they got their numbers.

From: Baker, Justin [mailto:justinbaker@rti.org]
Sent: Tuesday, December 03, 2013 1:15 PM
To: Ohrel, Sara
Subject: RE: today's call

Hi Sara,

Since we didn't get much time to go over specifics of the RP approach, do you think the technical team could share the appendix that provides those details? It would provide good context for the discussion of potential sensitivities.

Thanks,
Justin

From:	Cole, Jefferson
To:	Ohrel, Sara
CC:	Jenkins, Jennifer
Sent:	12/5/2013 10:31:00 AM
Subject:	RE: Janet and Sarah briefings
Attachments:	AF2 update for Janet 12 13 2013_SO_JC.pptx; pre-brief on AF2 for Sarah 12 2013_SO_JC.pptx

Gracias, and right back at you guys. My 'addition' edits are in blue, my deletes are ~~red strikethroughs~~. I left comments throughout the version for Sarah.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Thursday, December 05, 2013 8:58 AM
To: Cole, Jefferson
Cc: Jenkins, Jennifer
Subject: Janet and Sarah briefings

Here you are. Look good. My edits in orange. Jeff, you are up.

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Jenkins, Jennifer
To:	Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent:	12/4/2013 6:05:54 PM
Subject:	Sarah pre-brief slides
Attachments:	pre-brief on AF2 for Sarah 12 2013.pptx

Dear Team:

Attached is the set of slides Bill requested for the pre-brief with Sarah before the pre-brief with Janet next week. J

The slides for Janet are embedded here – this is likely too detailed in places but I thought it might be helpful to have a little feedback before we go chopping, especially because these are the slides we'll present tomorrow to OGC and OAQPS.

Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Jenkins, Jennifer
To:	Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent:	12/4/2013 5:36:47 PM
Subject:	slides for Janet
Attachments:	AF2 update for Janet 12 13 2013.pptx

Team Biomass:

Here is a first draft of the slides for the Janet briefing. Followed Bill's instructions… though apparently now we need a longer briefing for Sarah as well, with this plus a few more slides. I have another hour or so here, so will work on that now too. Will send Sarah's along when I am finished. Should easily rely on materials we already have…

Stay tuned
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Ohrel, Sara
To:	Cole, Jefferson
Sent:	12/3/2013 5:39:38 PM
Subject:	notes for Allen meeting
Attachments:	Meeting with Allen on LUMA.docx

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Cole, Jefferson
To:	Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent:	12/2/2013 4:13:11 PM
Subject:	Individual Appendices - Some of the Latest Versions
Attachments:	Appendix A - IPCC - BI.docx; Appendix B - Time - BI JC Edits.docx; Appendix C - Spatial Scale - BI.docx; Appendix E - Ref Point Baseline - BI.docx; Appendix F - Feedstock Proc and Use.docx; Appendix G - Ref Point Case Studies.docx; Appendix I - FABA Methodology.docx; Appendix M - Secondary and Mixed Feedstocks.docx; Appendix N - Working Forest.docx

All,

Here are a few of the latest versions of the appendices. These are all sourced from the doc that Bill edited/commented on. However, please note that Bill only commented/edited appendices A-E. I've attempted to indicate that in the file titles. Also, I am deliberately not attaching Waste (K) and Leakage (L) as we have more recent versions of those that I am working on.

One request, let us please not have ICF or anyone else combine the appendices until the very end.

Thanks!

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From:	Ohrel, Sara
To:	Flugge, Mark; Jenkins, Jennifer; Canham, Charlie; Prisley, Stephen; Thomas Buchholz (tbuchholz@sig-gis.com)
CC:	Sherry, Christopher; Cole, Jefferson; Baker, Justin
Sent:	12/2/2013 4:19:16 PM
Subject:	RE: CONFIRMED: Conference call to discuss conducting sensitivity analyses for terms in the BAF equation
Attachments:	Baseline construction and comparison 9 30 no FGHG_v12213.docx

Hi all,
As discussed, attached is a recent version of the future anticipated baseline approach (FABA) method for establishing initial baselines. We will discuss how the case studies are then built on top of these baselines tomorrow.
Please do not cite, distribute, copy in anyway.
Sara

From: Cole, Jefferson
To: Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent: 11/4/2013 12:15:01 PM
Subject: App D - Feedstock Categorization - My comments
Attachments: Appendix D - Feedstock Cat - 2013.09.17.2 - JC Edits.docx

Team,

I've attached my comments/edits to the Feedstock Categorization appendix (formerly B, now D). I have a few major concerns. Basically:

Ex. 5 - Deliberative

For what it's worth, I've drawn up a list below of what I think the feedstock table should look like. I've moved some categories around and put things more in line with what I'm used to seeing from the OTAQ perspective. I didn't put this in as a comment in the word doc, but if you guys agree, then I can put that in to send to ICF. Of course, if we change things up like this, some of the text would have to change too.

I'll be sending my further comments on the Time, Waste, and Non-CO_2 appendices soon.

Jeff

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Thomas Buchholz
To: 'Flugge, Mark'; Jenkins, Jennifer; Ohrel, Sara
Sent: 10/29/2013 11:57:27 AM
Subject: Cmments on framework
Attachments: AF2 main body 9 23 2013 clean no comments_ICF TBcomments.docx; AF2_Technical Documentation_09-23-13_clean TBcomments.docx

Hi Mark, Jen, and Sara,

I finally was able to screen through the framework and selected sections of the technical documentation. I have attached the latest versions I have with my comments (some sections highlighted yellow were only marked for my own understanding).

Some selected details that caught my attention:

Framework:

Ex. 5 - Deliberative

Technical documentation:

Ex. 5 - Deliberative

Thanks again for sharing,
Thomas

--
Thomas Buchholz, PhD, Senior Scientist
Spatial Informatics Group, LLC
3248 Northampton Ct., Pleasanton, CA 94588
cell: +1 802 881 5590, email: tbuchholz@sig-gis.com

From: Baker, Justin
To: Ohrel, Sara; Cole, Jefferson
CC: greg.latta@oregonstate.edu; Beach, Robert H.
Sent: 10/25/2013 11:59:06 AM
Subject: RE: notes from last call on biomass work
Attachments: Appendix P- Baseline construction and comparison 10 25 2013.docx

Hi everyone,

Here is the latest on App P(?).

I took a first pass at the conclusions as this was blank. I'm not sure if we need much more here.

I still need to update the figures, but wanted to send the text in case Greg wanted to work on this today.

Justin

From: Ohrel, Sara [mailto:Ohrel.Sara@epa.gov]
Sent: Thursday, October 24, 2013 3:09 PM
To: Baker, Justin; Cole, Jefferson
Cc: greg.latta@oregonstate.edu
Subject: notes from last call on biomass work

Hi team,
Just a reminder of where things stand:

Ex. 5 - Deliberative

ANYTHING ELSE?

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Srivastava, Amit
Sent:	10/22/2013 5:05:55 PM
Subject:	Accounting framework information
Attachments:	Biogenic_CO2_Accounting_Framework_Report_LATEST.pdf; CFI+Synthesis+Report_09-14-2011_final.pdf; Congressional Biomass Caucus 1_25_2012 FINAL.pptx; EPA-SAB-12-011-unsigned.pdf

Thank you for the all, Amit. I look forward to working with you all on this. As discussed I am sending along:

1. The link to the Science Advisory Board website that has all the information pertaining to the draft Accounting Framework review process, including our draft report, the SAB Panel response, the meeting notes, submitted public comments, etc.
2. EPA Draft Accounting Framework document
3. SAB Panel Response document
4. We did not discuss it, but also attached is the Synthesis of comments we received from a Call for Information on biomass (prior to draft Accounting Framework).
5. Another item we did not discuss but you may find useful is this PPT that Joe Goffman and Jen gave on the Hill in 2012.

Please let me know if you have any questions about any of this (I know it is a lot!).
Best wishes, and I hope the meeting next week goes well,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

Accounting Framework for Biogenic CO_2 Emissions

EPA Office of Air and Radiation

Presentation to
Congressional Biomass Caucus
January 25, 2012

Actions on Biogenic CO_2 Emissions

- July 2010: Call for Information on GHG Emissions Associated with Bioenergy and other Biogenic Sources
- July 2011: Deferral for CO_2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration (PSD) and Title V Programs
- September 2011: Draft Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources submitted to Science Advisory Board (SAB)
- January 2012: SAB releases preliminary draft of peer review report and holds public teleconference to discuss
- Mid-2012: SAB finalizes peer review report

Draft Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources

- Purpose: To conduct a "*detailed examination of the science associated with biogenic CO_2 emissions and to consider the technical issues that the Agency must resolve in order to account for biogenic CO_2 emissions in ways that are scientifically sound and also manageable in practice.*" (Letter from EPA Administrator to Members of Congress, January 12, 2011)

- To answer the question:
  - How can EPA account for a stationary source's onsite CO_2 emissions, taking the biological cycling of carbon into consideration, in a scientifically and technically rigorous manner?

Policy Context for Accounting Framework

- Consistent with existing stationary source regulatory programs:
  - Direct emissions from stationary source as starting point
  - Fossil and biogenic fuels analyzed comparably
- Critical link from direct emissions to land supplying feedstocks
- Framework generally applicable to all stationary sources:
  - Technical report, not specific to any policy or program
  - Flexible enough to be adapted within various types of programs

Draft accounting methodology in Framework

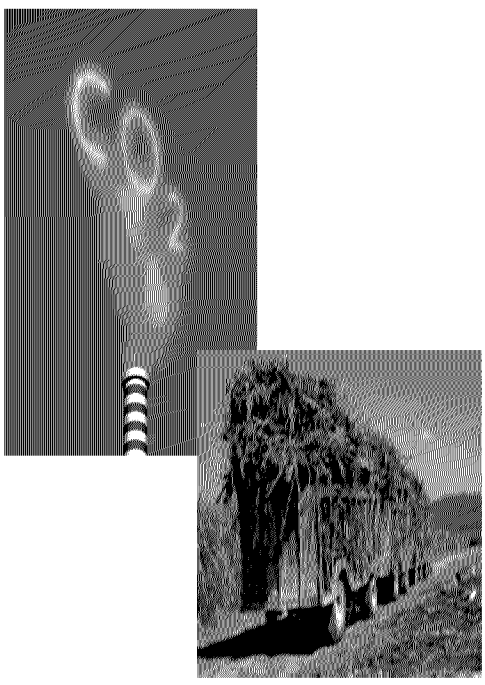
Step 1: Start with stack emissions

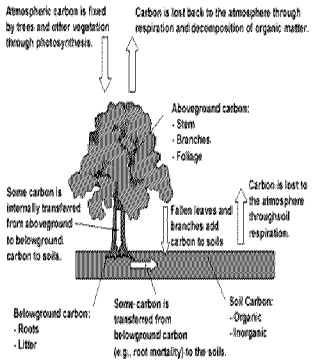
Step 2: Add emissions (carbon losses) caused by transferring feedstock to the facility for use (e.g., storage, transportation/ production losses of feedstock)

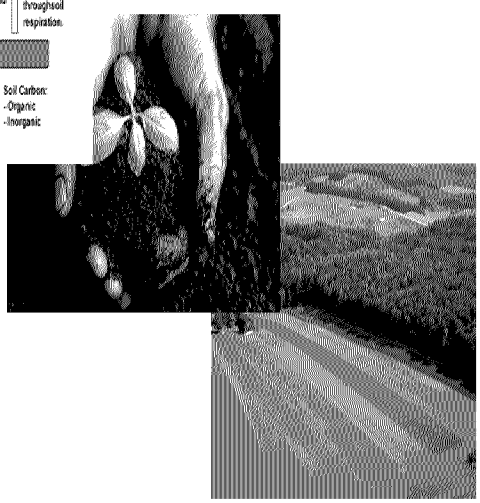
Step 3: Subtract either: a) carbon stored in feedstock growth and in the other carbon pools (e.g., soils) on the land providing the feedstock or b) avoided emissions

Step 4: Add/ subtract any estimated emissions associated with leakage or direct/ indirect land-use change

Throughout: Account for the carbon in feedstock that is passed through the stationary source to the product pool







Summary

- EPA's draft Accounting Framework Report:
  - outlines the scientific and technical issues that should be resolved in order to develop any accounting approach for biogenic CO_2 emissions from stationary sources
  - describes a methodology for developing a biogenic accounting factor (BAF) that adjusts onsite CO_2 emissions on the basis of information about growth of the feedstock and/ or avoidance of biogenic emissions and more generally the carbon cycle
- The SAB is in the process of reviewing the draft Accounting Framework Report and will finalize its peer review report later in 2012

Thank you

Questions?

From: Ohrel, Sara
To: Cole, Jefferson
CC: Jenkins, Jennifer; Sherry, Christopher
Sent: 10/22/2013 3:00:45 PM
Subject: RE: first draft of slides for Paul
Attachments: prebrief for paul 11 6 2013 with annex_SO_JC jcj_JC SO.pptx

Hey crew,
Here is the PPT. this version has our comments and notes in it, as well as text I will delete due to our conversation in the comments before submitting (in orange). I will take out the annex slides as well, and draft the email with the points you asked for, Jen. **Ex. 5 - Deliberative**
Ex. 5 - Deliberative so I will send as is (won't make much a difference anyway).
If anyone finds anything else they want to change before I send at 3:30pm, please let me know!
Sara

From: Cole, Jefferson
Sent: Tuesday, October 22, 2013 1:28 PM
To: Ohrel, Sara
Subject: RE: first draft of slides for Paul

Hey Sara,

I made some quick edits. As you'll see, it looks like you and Jen have a conversation going in some of the expanded comments, particularly in the table slides. I've left those to you to do as you wish. Let me know if there's anything else you'd like me to do with this before we send it out.

Thanks!

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Tuesday, October 22, 2013 1:05 PM
To: Cole, Jefferson
Subject: RE: first draft of slides for Paul

You want to go first?

From: Cole, Jefferson
Sent: Tuesday, October 22, 2013 1:04 PM
To: Sherry, Christopher; Jenkins, Jennifer; Ohrel, Sara
Subject: RE: first draft of slides for Paul

Okay. Thanks!

Jefferson Cole

Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Sherry, Christopher
Sent: Tuesday, October 22, 2013 1:04 PM
To: Cole, Jefferson; Jenkins, Jennifer; Ohrel, Sara
Subject: RE: first draft of slides for Paul

Jeff,

You and Sara should go ahead and finish – thanks.

Chris

From: Cole, Jefferson
Sent: Tuesday, October 22, 2013 1:03 PM
To: Jenkins, Jennifer; Ohrel, Sara; Sherry, Christopher
Subject: RE: first draft of slides for Paul

Chris,

Were you planning/able to review this and make any changes this afternoon, or shall Sara and I finish it off to send?

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
Sent: Tuesday, October 22, 2013 1:00 PM
To: Cole, Jefferson; Ohrel, Sara; Sherry, Christopher
Subject: RE: first draft of slides for Paul

Thanks Sara and Jeff!

Here is a version with my comments (and one edit) in response to comments from Jeff and Sara…

I will be traveling this afternoon, so could someone please take the pen to finish this up and send to Bill/ Suzie/ Allen for their review? In the email that you send to them, please request their feedback by COB Thurs or Fri, and also

Ex. 5 - Deliberative

Hope everyone has a great week – take care!

Jen

From: Cole, Jefferson
Sent: Tuesday, October 22, 2013 11:44 AM

To: Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Subject: RE: first draft of slides for Paul

All,

Here is another version, with my edits on top of Sara's.

My biggest change was to add a slide right before the results (called 'Results Preface')

Be sure to catch Sara's text edits in Green, especially the last slide before the annex.

Jeff

Jefferson Cole
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Climate Change Division
U.S. Environmental Protection Agency
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202.343.9671

From: Ohrel, Sara
Sent: Tuesday, October 22, 2013 9:07 AM
To: Cole, Jefferson; Jenkins, Jennifer; Sherry, Christopher
Subject: RE: first draft of slides for Paul

Hi all,
Here is the draft (sorry a lil later, it took me a bit to get logged in).

From: Cole, Jefferson
Sent: Monday, October 21, 2013 5:45 PM
To: Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Subject: RE: first draft of slides for Paul

My morning is fairly open. I can take a look at it after you get in, Sara.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Monday, October 21, 2013 4:33 PM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

Whatever works for everyone – I just didn't want you to have to worry about it while down there J
I will take a look on my train ride in the am and send it back around when I land in DC (about 830/845a,). So unless Jeff or Chris can look tonight, I can go first. I am not sure how their mornings look…

From: Jenkins, Jennifer
Sent: Monday, October 21, 2013 4:19 PM

To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

Would it help to push the 10 am deadline to something later, like 11 or 11:30 am?

Maybe we say first round of Team Biomass general comments back by that time in the morning, then I review and send another draft to you by 1:30 pm, then maybe you take the pen to send along to Bill/ Suzie/ Allen by COB? That works for me.

Hopefully this won't be a gigantic effort – it's just 12 or so slides and we don't have to have the supporting materials ready yet…

thanks
Jen

From: Ohrel, Sara
Sent: Monday, October 21, 2013 3:15 PM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

Thanks Jen. I should be able to look at this first thing tomorrow am (8am). Since you will be in meetings all afternoon, wouldn't it make more sense for one of us to take the pen tomorrow afternoon? We can try to get edits to you by 10am perhaps, but you will send it back around to us before 1pm so we can continue to work on it if needed before COB. That way, neither you or the rest of us will be so rushed.

From: Jenkins, Jennifer
Sent: Monday, October 21, 2013 3:04 PM
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: FW: first draft of slides for Paul

Team Biomass:

I made some edits to our original ppt based on these comments from Bill and Suzie. In general, I tried to Ex. 5 - Deliberative
Ex. 5 - Deliberative I basically just started over since Suzie was going in a different direction with this. Let me know what you think.

There are two versions here: one with the annexes (for us, so we keep our work) and one without (for Suzie/ Bill/ Allen, just so you can see what it will look like). If you edit, please edit the version **with** the annexes. I'll create a new non-Annex version from our "annexed" one to send it to Suzie, Bill, and Allen.

When we give this briefing to Paul, these are things that we refer to in the briefing that we should have ready as handouts:

- **Ex. 5 - Deliberative**
- Anything else (if so, need to add a reference to it in the ppt)?

Then, things that are not referenced in the ppt but we should be ready to pull out if asked as part of the discussion:

- **Ex. 5 - Deliberative**
- Anything else?

We are aiming to have this to Bill/ Suzie/ Allen by tomorrow COB. I am getting on a plane from IAD to Savannah at 5,

and will be in meetings for the rest of the afternoon beginning at 1:00. So… can you have comments/ edits back to me by 10 am tomorrow?

Thanks!
Jen

From: Irving, Bill
Sent: Monday, September 30, 2013 5:43 PM
To: Jenkins, Jennifer; Kocchi, Suzanne; Ohrel, Sara; Fawcett, Allen
Cc: Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

I won't add any detailed comments, but do support Suzie's suggestions for streamlining. It will be particularly important to communicate 2c and 2d to Paul. Also, we will need to explain **Ex. 5 - Deliberative**

Ex. 5 - Deliberative

From: Jenkins, Jennifer
Sent: Monday, September 30, 2013 4:35 PM
To: Kocchi, Suzanne; Ohrel, Sara; Irving, Bill; Fawcett, Allen
Cc: Sherry, Christopher; Cole, Jefferson
Subject: Re: first draft of slides for Paul

Thanks Suzie --

If we are open we can revamp by Thurs.

No need to push to next week!

From: Kocchi, Suzanne
Sent: Monday, September 30, 2013 4:31:12 PM
To: Ohrel, Sara; Jenkins, Jennifer; Irving, Bill; Fawcett, Allen
Cc: Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

Thanks everyone. Some initial thoughts, I think they are all higher level so I am not sure specific text edits would be helpful now:

Ex. 5 - Deliberative

Ex. 5 - Deliberative

If you don't think we can revamp this in time, assuming we are open, we can push the Paul briefing to next week (or week after).

From: Ohrel, Sara
Sent: Monday, September 30, 2013 3:37 PM
To: Jenkins, Jennifer; Kocchi, Suzanne; Irving, Bill; Fawcett, Allen
Cc: Sherry, Christopher; Cole, Jefferson
Subject: RE: first draft of slides for Paul

Adding Allen to the email chain.

From: Jenkins, Jennifer
Sent: Monday, September 30, 2013 3:34 PM
To: Kocchi, Suzanne; Irving, Bill
Cc: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: first draft of slides for Paul

Very drafty

We will have handouts with the actual numbers for Ex. 5 - Deliberative
Ex. 5 - Deliberative Feedback?

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From: Cole, Jefferson
To: Ohrel, Sara; Baker, Justin
Sent: 10/21/2013 5:48:56 PM
Subject: RE: docs
Attachments: Appendix P- Baseline construction and comparison 9 19 13_so_cleaned2 - JCole Edits.docx

Sara and Justin,

No major comments or edits to Appendix P (or whatever it will eventually be called). Very interesting stuff!

As I mentioned on the phone, I made edits to the most recent clean version.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Friday, October 18, 2013 12:05 PM
To: Baker, Justin; Cole, Jefferson
Subject: docs

Hello gents,
Here are the current documents that I have on the FABA appendices for our discussion today:

1. App H on background and rationale for FABA
2. 2 versions of P (baseline methods): one with Allen's comments, one cleaned after Allen' comments for submission to Bill et al 9/24
3. 2 docs pertaining to FABA case studies

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Cole, Jefferson
Sent: 10/18/2013 3:03:27 PM
Subject:
Attachments: Appendix B 9 17 13.docx

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Cole, Jefferson
Sent: 10/17/2013 2:12:57 PM
Subject: RE: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Great, I will have JB update the invite.
Yes, Robert said that same thing J

From: Cole, Jefferson
Sent: Thursday, October 17, 2013 2:12 PM
To: Ohrel, Sara
Subject: RE: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Hey Sara,

I'll be here, and would certainly be interested in calling in. Robert is in China and then Argentina? He is a worldly fellow.

J

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Thursday, October 17, 2013 1:57 PM
To: Cole, Jefferson
Subject: RE: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Thanks Jeff. Still bummed about both.
I have a call lined up with Justin tomorrow at 12:15 if you would like to join (can set up the call in line). Robert is out of the country (in China then Argentina) until next Friday, and I am out the week of Oct 27 in Japan at EMF.

From: Cole, Jefferson
Sent: Thursday, October 17, 2013 1:38 PM
To: Ohrel, Sara
Subject: RE: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Indeed.

Sorry about the two canceled trips.

Want to have a call with RTI at some point this week? A re-kickoff of sorts? On the other hand, I suspect you've already been in touch with them.

Hope you enjoyed the time off!

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division

U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Ohrel, Sara
Sent: Thursday, October 17, 2013 11:11 AM
To: Cole, Jefferson
Subject: FW: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Welcome back J
FYI

From: Noe, Paul [mailto:Paul_Noe@afandpa.org]
Sent: Thursday, October 10, 2013 12:38 PM
To: Goffman, Joseph
Cc: Lancey, Stan; Dunham, Sarah; Gunning, Paul; Jenkins, Jennifer; Ohrel, Sara; Irving, Bill; Santiago, Juan; Wood, Anna; Browne, Cynthia; Kocchi, Suzanne
Subject: NCASI Study, Biomass Energy from Forest Products Manufacturing Residuals

Dear Joe:

I wanted to let you know that earlier this week, NCASI posted the final version of their report, "Greenhouse Gas and Fossil Fuel Reduction Benefits of Using Biomass Manufacturing Residuals for Energy Production in Forest Products Facilities." The study is based on a robust dynamic analysis.

As explained in the attached summary prepared by AF&PA, the study shows large greenhouse gas reduction benefits from using manufacturing residuals (such as black liquor, bark, sawdust, paper recycling residuals, and waste water treatment residuals) for energy in the forest products industry – avoiding the emission of approximately 218 million metric tons of CO2e annually. (This is equivalent to removing over 40 million cars from the road.) This includes both fossil fuel displacement benefits as well as avoided biogenic greenhouse gas emissions that would occur from disposing of the residuals, such as through landfilling or incineration.
Even if the benefits of fossil fuel displacement are set aside under a narrower "alternative fate" perspective, the benefits of using manufacturing residuals for energy rather than disposing of them are still large – by our estimate, about 53 million metric tons of CO2e avoided annually, the equivalent of removing about 10 million cars from the road.

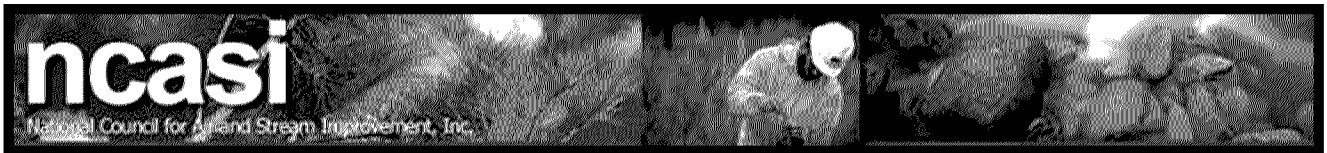
A link to the study is below. Please let me know if you have any questions.

Once the current funding issue is resolved, we would like to make this a part of the agenda for the meeting with you and your colleagues that has to be rescheduled.

Thank you for your consideration.

Best regards,

Paul



Greenhouse Gas and Fossil Fuel Reduction Benefits of Using Biomass Manufacturing Residuals for Energy Production in Forest Products Facilities (NCASI Technical Bulletin No. 1016)

NCASI recently posted a new report, Technical Bulletin No. 1016, on its website at www.ncasi.org. Member company employees, as well as government and academic personnel, may request a printed complimentary copy of this report by replying to this message or calling (352) 331-1745. The PDF file is freely available to the public for download.

NCASI Technical Bulletin No. 1016: Greenhouse Gas and Fossil Fuel Reduction Benefits of Using Biomass Manufacturing Residuals for Energy Production in Forest Products Facilities

[Bulletin technique no. 1016 : Avantages liés à la rédution des émissions de gaz à effet de serre et de la consommation d'énergie fossile de l'utilisatoin de résidus manufacturiers de biomasse pour la production d'énergie par les usines de produits forestiers]

NCASI continues its work to address the United States Environmental Protection Agency's expressed interest in the life cycle greenhouse gas benefits associated with using biomass. The regulatory decisions EPA makes on this topic have the potential to greatly affect the costs of doing business and the perception of forest industry's products in the marketplace. The forest products industry, therefore, has a great deal at stake in ensuring that the agency's deliberations on this topic are well informed.

In an earlier report, NCASI examined the life cycle greenhouse gas and non-renewable energy benefits of using black liquor in the kraft recovery system. In the study described herein, NCASI extends this work to other types of biomass-based manufacturing residuals used for energy generation within the industry. While there are numerous studies examining the life cycle impacts of biomass energy, none has applied the comprehensive approach used here by NCASI to characterize the impacts of the industry's use of energy produced from biomass residuals.

In this study, NCASI has compared systems involving the use of biomass-based manufacturing residuals for energy to comparable systems relying on fossil fuels. The results indicate that the industry's use of these manufacturing residuals for energy avoids the release of approximately 110 million metric tons of CO_2E per year.

Combining the results of this study with the results of the previous NCASI study on black liquor reveals that each year's use of biomass-based manufacturing residuals (including black liquor) in the US forest products industry avoids the emission of approximately 218 million metric tons of CO_2E, an amount more than three times the annual direct emissions of CO_2 from fossil fuel combustion in the industry.

This study is one of a series of ongoing NCASI projects having the objective of helping the forest products industry and its stakeholders better understand the greenhouse gas and energy impacts of using forest biomass as a raw material and fuel.

List of recent NCASI Technical Bulletins >>

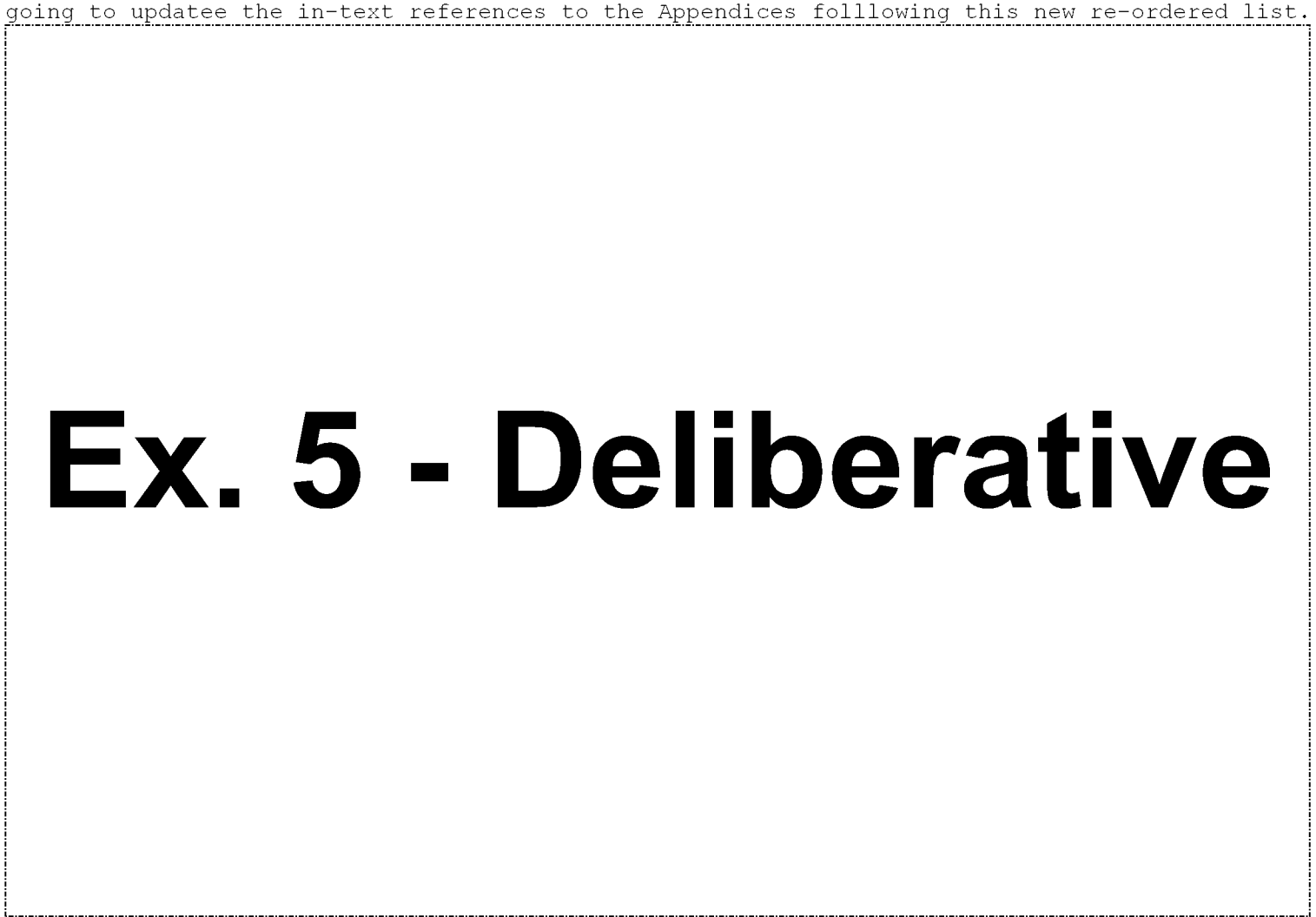
From: Jenkins, Jennifer
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent: 9/23/2013 9:17:11 AM
Subject: main body updates
Attachments: AF2 main body 9.23.2013 clean with comments.docx; AF2 main body 9.23.2013 tracked with comments.docx

Team:

I am attaching the tracked and commented versions of the main body of AF2 for your review, as desired...

Couple of questions/ items for Team Biomass discussion as we pull togehter the document today.

Most urgent: Appendix ordering. Here is what I have -- this is embedded in the version I just sent to ICF. If we want to change this around, we should let them know ASAP because they are going to updatee the in-text references to the Appendices folllowing this new re-ordered list.



Ex. 5 - Deliberative ICF will leave it in this version but we should discuss.

thanks!
Jen

From:	Ohrel, Sara
To:	Latta, Greg
Sent:	9/20/2013 11:54:52 AM
Subject:	FW: appendix P on anticipated baseline construction
Attachments:	Appendix P- Baseline construction and comparison 9 19 13_so.docx; Appendix P- Baseline construction and comparison 9 19 13_so_cleaned.docx

Attached is the cleaned document I just sent to Allen. Also, I am attaching the tracked changes document for our continued efforts J
(I did make some small editorial changes to the cleaned version).
I will get back to H now. What time can you chat with me about App I?
Thanks! 1 down, 2 to go!
Sara

From: Ohrel, Sara
Sent: Friday, September 20, 2013 11:53 AM
To: Fawcett, Allen
Cc: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: appendix P on anticipated baseline construction

Hello Allen,

As we discussed, attached is the draft Appendix P on the methodology for constructing the alternative anticipated baselines. We welcome your edits and comments. We still need to do the conclusion and there are few areas we intend to refine (including items in teal and **Ex. 5 - Deliberative**).

Thank you in advance for your time and constructive feedback!
Sara

PS – others on Team Biomass, please of course send your comments too if you have time to review this round!

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Jenkins, Jennifer
To:	Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent:	9/19/2013 4:15:30 PM
Subject:	FW: Appendices G and K
Attachments:	AF2_Appendix G_09-16-2013_tracked changes jcj2.docx; AF2_Appendix K_09-17-2013_clean_CS.docx

FYI – meant to cc: you guys on this. ICF will turn around G and K by tomorrow COB.

From: Jenkins, Jennifer
Sent: Thursday, September 19, 2013 12:44 PM
To: 'mflugge@icfi.com'
Subject: Appendices G and K

Thanks Mark –

Here are comments on G and K. Appreciate the QTA on these, as always… Please let me k now if you have any questions/ comments.

Thanks!
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From: Latta, Greg
To: Ohrel, Sara
Sent: 9/19/2013 11:22:20 AM
Subject: RE: app P
Attachments: Appendix P- Baseline construction and comparison 9 17 13.docx

Not much new. Still working on Ex. 5 - Deliberative
Ex. 5 - Deliberative

From: Ohrel, Sara [mailto:Ohrel.Sara@epa.gov]
Sent: Thursday, September 19, 2013 7:33 AM
To: Latta, Greg
Subject: app H

Getting closer, still a ways to go
J

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Latta, Greg
Sent:	9/17/2013 12:28:57 PM
Subject:	RE: App H
Attachments:	Appendix P- Baseline construction and comparison SO 9 17 13.docx; Appendix P- Baseline construction and comparison SO 9 17 13_clean.docx

Thanks. I had hoped to work on it some more but here it is. both with and without tracked changes, so you can pick which one you want to work off of.

From: Latta, Greg [mailto:greg.latta@oregonstate.edu]
Sent: Tuesday, September 17, 2013 12:18 PM
To: Ohrel, Sara
Subject: RE: App H

Here is H as it sits. I was debating bringing in the old text for the parts that could use it, but thought I'd just send along what I had as I had already missed the EST morning. Send P along when ready.

From: Jenkins, Jennifer
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent: 9/9/2013 11:33:50 AM
Subject: Appendix D
Attachments: TO 003_REVISED DRAFT_Appendix D_09-03-2013 jcj.docx

Is attached.

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Onward! Occurred to me that we want to send App K back to ICF as well for a QTA, so I'll work on that one next. May have to take some time this afternoon first to process the new TO for rulemaking activity though.

-----Original Message-----
From: Ohrel, Sara
Sent: Monday, September 09, 2013 10:25 AM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

If that is what they want, then this plan sounds good. Q!
Status update: halfway through C. now working with RTI on FABA Apps, but will get back to C today.

-----Original Message-----
From: Jenkins, Jennifer
Sent: Monday, September 09, 2013 10:23 AM
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Thanks Sara!

Ex. 5 - Deliberative

Thanks all
Jen

-----Original Message-----
From: Ohrel, Sara
Sent: Monday, September 09, 2013 7:50 AM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Hi team,
I hope you enjoyed the weekend. Here is App A. I revamped it, wrote some new text, pulled old text from various documents (old A's, old main docs). Hope it is what you hoped and dreamed it would be :) I am attaching what I started with for your reference.
Jen, I will start on C this am and will plan to return it for ICF submission this pm.
Sara

-----Original Message-----
From: Jenkins, Jennifer
Sent: Sunday, September 08, 2013 7:38 PM
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Here is an edited version of Appendix C. Needed a lot of work Ex. 5 - Deliberative Phew!

Next up for me: App D, App F, then reviewing your good work on E/N/K.

I can have D finished by noon tomorrow.

Sara, can we aim to send App C to ICF by COB tomorrow (Monday)? If we do that we can probably wait until Tuesday morning to send App D. Can't wait beyond that because we want ICF to return both to us by Friday 9/13.

See you all soon
Jen

From: Ohrel, Sara
Sent: Saturday, September 07, 2013 11:14 AM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: Re: goal of App A

Thanks Jen. I worked a couple more hours on App A this am and only have a small section left to complete. We have guests coming now and off to an O's game so I will resume tomorrow.

From: Jenkins, Jennifer
Sent: Saturday, September 07, 2013 8:52:10 AM
To: Sherry, Christopher; Ohrel, Sara; Cole, Jefferson
Subject: RE: goal of App A

Thanks everyone --

Glad we are staying on schedule! Appreciate everyone's hard work.

I am finished with the Ex. 5 - Deliberative Ex. 5 - Deliberative I won't be able to get back to this until later tonight, however, so I am sending along my edits now in case you (Sara) get to this before I do. I'll pick it back up tonight and tomorrow morning.

Enjoy!
Jen

From: Sherry, Christopher
Sent: Friday, September 06, 2013 6:14 PM
To: Jenkins, Jennifer; Ohrel, Sara; Cole, Jefferson
Subject: RE: goal of App A

Jen and Team,

Here are my edits and comments to App K. There are a few questions for the team in comments

(b)(5) deliberative

Chris

Christopher Sherry
Climate Change Division, Climate Policy Branch Office of Atmospheric Programs U.S. Environmental Protection Agency
Phone: 202-343-9530
Mobile: 202-340-3379

sherry.chris@epa.gov<mailto:sherry.chris@epa.gov>

From: Jenkins, Jennifer
Sent: Friday, September 06, 2013 5:08 PM
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Update from me: I am halfway through edits on App C, will have to send you that tomorrow morning & App F by Monday. Hopefully nobody is sitting there with bated breath awaiting the imminent arrival of these pieces.

Sara, I will work on D when I finish with C & F. I think we do need to send C & D to ICF on Monday.

Jeff & Chris, please send updates as to status before you leave today.

thanks!
Jen

From: Ohrel, Sara
Sent: Friday, September 06, 2013 3:26 PM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Thanks for your feedback Jen. It does help. I agree the details should go in A though we need a good synopsis/explanation in the main doc (which Bill actively asked to be filled in to the extent that I did in part II). I will try to reconcile all of this, though doing so ensures that I will not get to B today. nonetheless, I would rather strike at this while the iron is hot ☺ Once I get as far as I can, I will explain what I have done and if there are any corresponding edits to the main doc, I will make them in the document Jeff C marked up and send it around as well (hopefully it won't come to that).
Thanks!!!

From: Jenkins, Jennifer
Sent: Friday, September 06, 2013 3:22 PM
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Subject: RE: goal of App A

Thanks Sara - this is a helpful description of the issue with Appendix A.

Here are my thoughts: (b)(5) deliberative

I hope this helps -- does it?

Jen

From: Ohrel, Sara
Sent: Friday, September 06, 2013 2:22 PM
To: Jenkins, Jennifer; Sherry, Christopher; Cole, Jefferson
Subject: goal of App A

Hi team,
Something to ponder - (b)(5) deliberative

(b)(5) deliberative

So before I continue on this/tear it up I ask: (b)(5) deliberative

(b)(5) deliberative

Please let me know what you think.
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Latta, Greg
Sent: 9/9/2013 11:29:46 AM
Subject: FW: App p and plan for today
Attachments: Appendix P- Biomass Consumption Projections Methodology Section SO.docx

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From: Ohrel, Sara
Sent: Monday, September 09, 2013 11:00 AM
To: 'Baker, Justin'
Subject: App p and plan for today

App P
- Sara send initial App P edits
- Justin will merge with his.
- Justin: app p edits by time he leaves.
- Sara will pick up P after Justin sends it.

App I
- Tonight, Justin will work on App I results tables

Plan to confer tomorrow. I can do 9-93o or 11am-12pm, 1-1:30pm, 230-5.

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Baker, Justin
To:	Ohrel, Sara; Beach, Robert H.; greg.latta@oregonstate.edu; Cole, Jefferson
Sent:	9/5/2013 5:38:31 PM
Subject:	Appendix P- Biomass Consumption Projections Methodology Section.docx
Attachments:	Appendix P- Biomass Consumption Projections Methodology Section.docx

Dear all,

Please find a draft of Appendix P. I have left a few comments in places where I would like to do a bit more work this weekend, but the basics are here.

Sending data in the next email.

Justin

From: Jenkins, Jennifer
To: Ohrel, Sara; Sherry, Christopher; Cole, Jefferson
Sent: 9/3/2013 5:43:30 PM
Subject: Fw: (EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Revised Appendix D
Attachments: TO 003_REVISED DRAFT_Appendix D_09-03-2013.docx

For your reading pleasure

From: Flugge, Mark <Mark.Flugge@icfi.com>
Sent: Tuesday, September 03, 2013 5:27:20 PM
To: Jenkins, Jennifer
Cc: Thomas Buchholz (tbuchholz@sig-gis.com); Biggar, Sarah
Subject: (EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Revised Appendix D

Hi Jen: please find attached the revised Appendix D in tracked changes addressing recent EPA comments for TO 003: *Revisions to Accounting Framework for GHG Emissions from Bioenergy and Other Biogenic Sources*.

The revised Appendix C will follow under separate cover.

Best regards,
Mark

From: Jenkins, Jennifer [mailto:Jenkins.Jennifer@epa.gov]
Sent: Tuesday, September 03, 2013 9:23 AM
To: Flugge, Mark
Subject: RE: edits for our conversation tomorrow

Perfect. Thank you!

From: Flugge, Mark [mailto:Mark.Flugge@icfi.com]
Sent: Tuesday, September 03, 2013 9:18 AM
To: Jenkins, Jennifer
Subject: RE: edits for our conversation tomorrow

Hi Jen: I wanted to provide a status update: ICF will be sending two files to EPA today (Tuesday): (1) a revised Appendix C addressing recent EPA comments—e.g., Ex. 5 - Deliberative

Ex. 5 - Deliberative

Ex. 5 - Deliberative

Best regards,
Mark

From: Jenkins, Jennifer [mailto:Jenkins.Jennifer@epa.gov]
Sent: Thursday, August 15, 2013 11:52 AM
To: Flugge, Mark
Cc: Ohrel, Sara; Sherry, Christopher; Epanchin, Pete; Cole, Jefferson
Subject: RE: edits for our conversation tomorrow

All:

Attached are my edits to the rest of Appendices C and D, and some edits to Ex. 5 - Deliberative

for our conversation this afternoon.

Best
Jen

From: Jennifer Jenkins [mailto: Ex. 6 - Personal Privacy]
Sent: Wednesday, August 14, 2013 11:41 PM
To: mflugge@icfi.com
Cc: Ohrel, Sara; Sherry, Christopher; Epanchin, Pete; Cole, Jefferson; Jenkins, Jennifer
Subject: edits for our conversation tomorrow

Dear Mark:

I am attaching a preliminary set of edits for you to consider in advance of our discussion on Appendices C and D tomorrow. This version includes my edits up until the last section of Appendix C -- I will endeavor to send the rest of the edits (on the last section of C and D) to you tomorrow morning but wanted to get this out the door so you could review before our 1:30 call. (Also note I am working from home, so am sending from my personal email -- please reply to all so any email traffic goes to my EPA address as well.) A preview: I have hardly any comments on Appendix D, so the only thing we are really missing here is Ex. 5 - Deliberative section in Appendix C.

In addition to the comments and edits embedded here, some high-level comments on Appendix C:

Ex. 5 - Deliberative

thanks and talk to you tomorrow
Jen

From:	Cole, Jefferson
To:	Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent:	9/3/2013 5:04:47 PM
Subject:	Comments on Main Document
Attachments:	AF2 main body 7.22.2013 for Paul - JCOLE COMMENTS AND NOTES.docx

Hello All,

I've attached my comments and line item edits made to the main doc. Note that these were made in track changes in the clean version that was sent to Paul for review back in July.

A lot of my comments are likely just trying to understand some of the basics. In that case, I can try to talk with Sara one on one so I don't unnecessarily waste the entire team's time on bringing me up to speed.

... I'll just waste Sara's time.

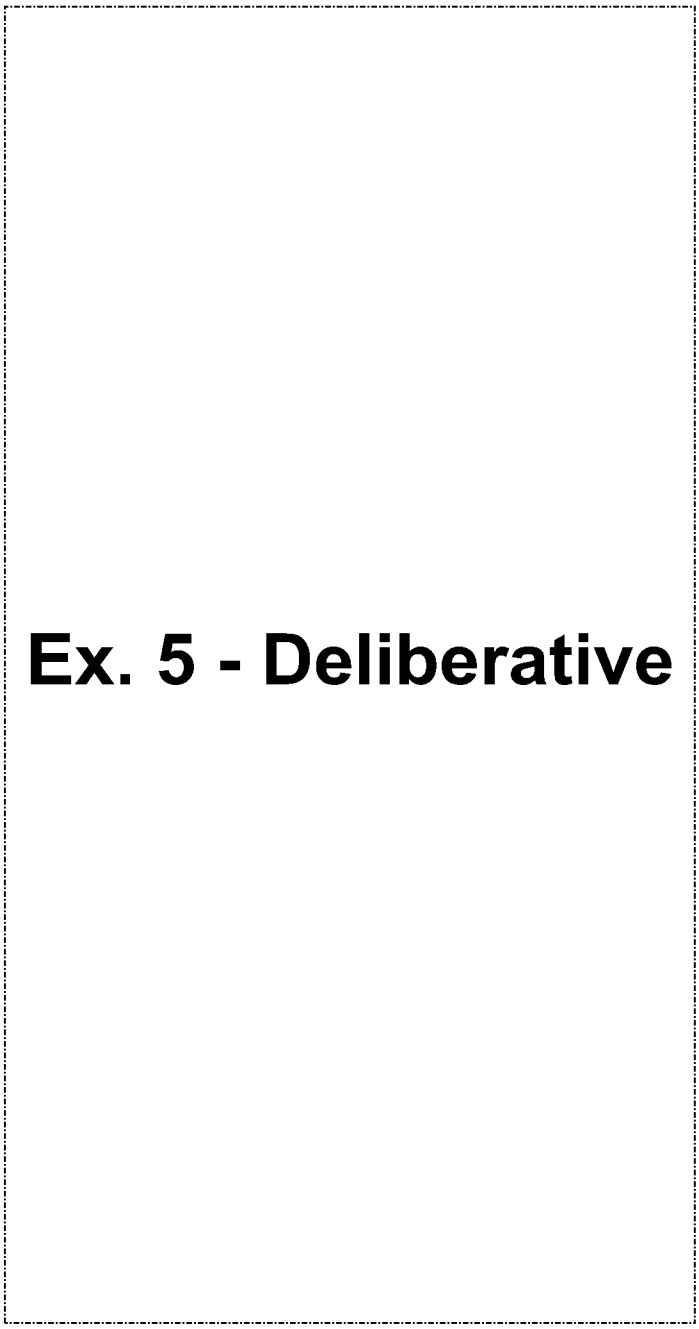
Comments on E, N, and J will be forthcoming tomorrow.

Jeff

Jefferson Cole
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
cole.jefferson@epa.gov
202.343.9671

From: Jenkins, Jennifer
To: Brooks, MichaelS; Sherry, Christopher; Grogan-McCulloch, Lisa; Ohrel, Sara
Sent: 8/27/2013 9:22:47 AM
Subject: RE: Biomass Feedstocks

Michael – This is the list currently in the Appendix on feedstocks (Appendix B for those in the know) and in the main body of AF2. Ex. 5 - Deliberative Team Biomass, pls double-check…



From: Brooks, MichaelS
Sent: Tuesday, August 27, 2013 9:16 AM
To: Jenkins, Jennifer; Sherry, Christopher; Grogan-McCulloch, Lisa; Ohrel, Sara
Subject: Biomass Feedstocks

Can you give me the list of **Ex. 5 - Deliberative**

Cheers,

Michael S. Brooks
919.541.3539

US EPA
OAQPS, AQPD
Operating Permits Group

From:	Flugge, Mark
To:	Jenkins, Jennifer; Ohrel, Sara
CC:	Biggar, Sarah; Sherry, Christopher; Epanchin, Pete
Sent:	8/20/2013 10:42:17 AM
Subject:	(EP-BPA-12-H-0022, EP-B12H-00125/TO 003, Task 2) Copies of Appendix C and Appendix D
Attachments:	AF2 technical documentation_pe.App.C 8.19.13 PFL.docx; AF2 technical documentation_pe.App.D 8.19.13 PFL.docx

Hi Team Biomass: please find attached copies of the separated versions of Appendix C and Appendix D for the Revised Accounting Framework Report (AF2) for TO 003: *Revisions to Accounting Framework for GHG Emissions from Bioenergy and Other Biogenic Sources*.

ICF plans to maintain version control of these two appendices while we work with the technical team to address Jen's recent comments.

In the meantime, if there are additional comments, it would be useful to receive them in these files in tracked changes. That said, we are also happy to cross-walk them into these versions if it is easier.

Best regards,
Mark

MARK FLUGGE | Manager | 202.862.1231 (o) | Mark.Flugge@icfi.com | icfi.com
ICF INTERNATIONAL | 1725 I Street NW, Suite 1000, Washington, DC 20006 | 202.340.7528 (m)
Connect with us on social media.

From: LaFarge, Pier
Sent: Monday, August 19, 2013 11:51 PM
To: Flugge, Mark
Cc: Phung, Thuy; Biggar, Sarah; Steele, Rachel
Subject: RE: Request: QTR for biogenic accounting project

Hi Mark,

Please see updated Appendix C and D documents with updated equations and all cross references and captions fixed.
Pier

From: Flugge, Mark
Sent: Monday, August 19, 2013 11:58 AM
To: LaFarge, Pier
Cc: Phung, Thuy; Biggar, Sarah; Steele, Rachel
Subject: Request: QTR for biogenic accounting project
Importance: High

Hi Pier: thank you for joining the biogenic accounting project team.

As discuss in our last meeting, please find the latest draft of the technical appendices with comments attached and the previous draft with intact equations. For no later than close of business today (August 19), please:

- ü Create a separate Appendix C (and Appendix D) retaining comments and tracked changes
- ü Re-insert equations from previous draft
- ü Number tables and figure captions C-1, C-2, etc.
- ü Update cross-references
- ü Insert equation numbers and equation cross-references
- ü Distribute re-worked files to me and those copied on this email

Thanks again,
Mark

From: Jenkins, Jennifer [mailto:Jenkins.Jennifer@epa.gov]
Sent: Thursday, August 15, 2013 11:52 AM
To: Flugge, Mark
Cc: Ohrel, Sara; Sherry, Christopher; Epanchin, Pete; Cole, Jefferson
Subject: RE: edits for our conversation tomorrow

All:

Attached are my edits to the rest of Appendices C and D, and Ex. 5 - Deliberative for our conversation this afternoon.

Best
Jen

From: Jennifer Jenkins [mailto: Ex. 6 - Personal Privacy]
Sent: Wednesday, August 14, 2013 11:41 PM
To: mflugge@icfi.com
Cc: Ohrel, Sara; Sherry, Christopher; Epanchin, Pete; Cole, Jefferson; Jenkins, Jennifer
Subject: edits for our conversation tomorrow

Dear Mark:

I am attaching a preliminary set of edits for you to consider in advance of our discussion on Appendices C and D tomorrow. This version includes my edits up until the last section of Appendix C -- I will endeavor to send the rest of the edits (on the last section of C and D) to you tomorrow morning but wanted to get this out the door so you could review before our 1:30 call. (Also note I am working from home, so am sending from my personal email -- please reply to all so any email traffic goes to my EPA address as well.) A preview: I have hardly any comments on Appendix D, so the only thing we are really missing here is some edits to Ex. 5 - Deliberative section in Appendix C.

In addition to the comments and edits embedded here, some high-level comments on Appendix C:

Ex. 5 - Deliberative

thanks and talk to you tomorrow
Jen

From: Ohrel, Sara
To: Cole, Jefferson
Sent: 8/13/2013 1:48:15 PM
Subject: FW: July 22 version of AF2
Attachments: AF2 main body 7.22.2013 for Paul.docx

Here it is, Jeff. Again, Part IV is very rough. Once you are done, we can chat!

-----Original Message-----
From: Jenkins, Jennifer
Sent: Monday, July 22, 2013 9:01 PM
To: Gunning, Paul
Cc: Kocchi, Suzanne; Irving, Bill; Ohrel, Sara; Epanchin, Pete; Sherry, Christopher; Fawcett, Allen
Subject: July 22 version of AF2

Dear Paul:

Attached please find the latest draft of the Accounting Framework for Biogenic CO2 Emissions from Stationary Sources, fondly known to Team Biomass as "AF2." We will need to keep editing and fine-tuning the few minor items we've flagged here, as you'll see. We'll probably also need to update the text as we complete the Technical Appendices.

This represents the collective effort of all 4 of us, as well as input and edits from Allen, Bill, and Suzie. In recent weeks Sara, Pete, and Chris have been doing the heavy lifting: the really good work here is all theirs. I'll take responsibility for any errors!

We look forward to your feedback.

Jen

From: Ohrel, Sara
To: Latta, Greg
Sent: 8/12/2013 12:38:45 PM
Subject: RE: H outline
Attachments: TO 003_DRAFT_Appendix G_04-19-2013_clean.docx

From: Latta, Greg [mailto:greg.latta@oregonstate.edu]
Sent: Monday, August 12, 2013 12:15 PM
To: Ohrel, Sara
Subject: RE: H outline

From: Ohrel, Sara [mailto:Ohrel.Sara@epa.gov]
Sent: Monday, August 12, 2013 8:54 AM
To: Latta, Greg
Subject: H outline

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Epanchin, Pete
To: Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent: 8/1/2013 5:31:26 PM
Subject: Appendix B. Feedstock Delineation
Attachments: TO 003_REVISED_Appendix B_jcj 5.17.2013.PE 01aug.docx

Howdy Team Biomass,
Attached is Appendix B with all of my comments and edits.

The main comment I had was: **Ex. 5 - Deliberative**

Ex. 5 - Deliberative

If you guys want to weigh in on this, I am happy to pick the pen back up and do edits. Just let me know. Otherwise, I am not sure who the Pen goes to. Looking at Sara's schedule, I didn't see anyone assigned to B after me.

This version is also on the G drive.

-Pete

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Ohrel, Sara
To: Epanchin, Pete
Sent: 7/30/2013 10:11:35 AM
Subject: RE: Tuesday July 30 meeting with SAF

Sounds good. I will bring my meeting stuff to the AH mtg in case we need to roll.

From: Epanchin, Pete
Sent: Tuesday, July 30, 2013 10:10 AM
To: Ohrel, Sara; Jenkins, Jennifer; Irving, Bill
Subject: RE: Tuesday July 30 meeting with SAF

Thanks, Sara. I will go to. Probably start walking there after the all hands meeting, around 12:30. Want to meet in the lobby & walk down there together?

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Ohrel, Sara
Sent: Tuesday, July 30, 2013 10:08 AM
To: Epanchin, Pete; Jenkins, Jennifer; Irving, Bill
Subject: RE: Tuesday July 30 meeting with SAF

H Pete,
I am planning on going down to the Bill J. Joe G scheduled the meeting but who knows if he will be there.

From: Epanchin, Pete
Sent: Tuesday, July 30, 2013 9:52 AM
To: Jenkins, Jennifer; Irving, Bill; Ohrel, Sara
Subject: RE: Tuesday July 30 meeting with SAF

Who is going to this meeting? I was hoping to just call in to it rather than make the trek to ARN. Is anyone planning on physically being there? Or are they meeting with Joe G or another manager from the front office?
Thanks,
Pete

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Jenkins, Jennifer
Sent: Tuesday, July 30, 2013 6:56 AM
To: Irving, Bill; Ohrel, Sara; Epanchin, Pete
Subject: Fw: Tuesday July 30 meeting with SAF

Hmmm... Here is Reid's response. I won't be able to join you, but please pick up an extra copy of the slides! I look forward to hearing about what they have to say.

From: Miner, Reid <RMiner@NCASI.org>
Sent: Tuesday, July 30, 2013 6:45:56 AM
To: Jenkins, Jennifer
Subject: RE: Tuesday July 30 meeting with SAF

Hi Jen
I have not been able to get permission from SAF for an early distribution of the manuscript we have submitted to Science. I expect to be able to share the slides with you after the meeting today, although it may only be in hard copy. The presentation deals with a number of topics that suggest that the methods often used to estimate net carbon impacts associated with using forest biomass for energy miss some important factors that tend to mitigate those fluxes.
Sorry I can't provide more at this point.
Reid

Reid Miner, Vice President-Sustainable Manufacturing
NCASI
P.O.Box 13318
Research Triangle Park, NC 27709
Phone +1 (919) 941-6407
Mobile +1 (919) 600-1022
Fax +1 (919) 941-6401
Email: RMiner@ncasi.org

From: Jenkins, Jennifer [mailto:Jenkins.Jennifer@epa.gov]
Sent: Friday, July 26, 2013 11:05 AM
To: Miner, Reid
Subject: Tuesday July 30 meeting with SAF

Reid –

I see that we have a meeting scheduled for next Tuesday afternoon with you and SAF. I'm not sure I can make it to that meeting due to a prior obligation: I wondered if you could tell us a little bit ahead of time about what you plan to discuss/ present?

Thanks!
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Ohrel, Sara
To:	Eschmann, Erich
CC:	Swanson, Nicholas; Stevens, William
Sent:	7/26/2013 9:55:21 AM
Subject:	FASOM bioenergy paper and recent NREL paper on delivered biomass costs for cofiring and other good info
Attachments:	CofireTAR 2012.pdf; JFE_25192.pdf

Erich,
The attached NREL paper may have what you need for delivered biomass costs for cofiring.
Also attached is the FASOM bioenergy paper I mentioned yesterday. Please do not distribute as I don't think it is out yet (but will be soon).
Best,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Epanchin, Pete
To: Jenkins, Jennifer; Ohrel, Sara; Sherry, Christopher
Sent: 7/25/2013 3:50:28 PM
Subject: Appendices A, C, D, F, G, & M
Attachments: AF2 technical documentation_pe.Apps.A&C&D&F&G&M.07-08-13.docx

Hi Gang,
To follow up with our meeting yesterday I am sending comments (on Appendices C & D) I made in a July 8 email I sent you.
The attached doc is the bundled Appendices document that ICF formatted. My comments on Appendices A, F, G, & M are also included in this document and this document is the latest version for A, C, D, F, G, & M. Refer to the document to see my comments and edits. Otherwise, here are a few general comments related to a few of the Appendices:

My main comments on Appendix C:

Ex. 5 - Deliberative

My main comments on Appendix D:

Ex. 5 - Deliberative

My main comments on Appendix F:

Ex. 5 - Deliberative

-----Original Message-----

From: Jenkins, Jennifer
Sent: Wednesday, June 19, 2013 9:59 AM
To: Ohrel, Sara; Sherry, Christopher; Epanchin, Pete
Subject: Team Biomass plans for Weds and Part III edits

Team Biomass:

Attached are my edits to Section III. I used Pete's latest version and I only edited Part III. I think our original plan had been for Chris to take it today and conduct a kind of birds-eye review of the edits we've made to Parts I through III while he was gone...

I haven't been able to access my EPA email via webmail or blackberry, buyt I was just this morning able to figure this out. Still no bberry access, so my response time today will be slow. For quick reply please cc: my personal email: Ex. 6 - Personal Privacy Or send me a text letting me know there is an email waiting! Ex. 6 - Personal Privacy

Hopefully this plan for a birds-eye review still holds -- please let me know where folks are on this today.

In the meantime, let's plan for our Team Biomass session tomorrow morning. We want to wrap up any loose ends on the technical side, and we want to plan for revising the Appendices.

On the technical side, here is my list of unresolved issues, based on Part III. Please review, add, comment:

Ex. 5 - Deliberative

On Appendices, I suggest that we begin this discussion where we left off in May when we picked up the main body again. So -- each of us had a few Appendices assigned to us for review. If you could, please come to the meeting tomorrow morning with a suggestion for how we ought to proceed with those Appendices assigned to you, whether or not you have actually been able to read and review them. Then we can go down the list, Appendix by Appendix, and work on a plan for moving them forward.

Thanks! See you tomorrow --
Jen

From: Creason, Jared
To: Ohrel, Sara
Sent: 7/25/2013 11:01:59 AM
Subject: RE:
Attachments: CofireTAR.pdf; LCATtechGuide.pdf; upstreamdb.zip

Hi;
There are two NETL tools I used in constructing the LCA. One is called PowerLCAT – from which I took heat rates, emission factors and production characteristics (capacity utilization, etc) for the gas plant.

The second is called Upstream Dashboard – from which I took the emission factors associated with the various sources of gas, as well as the transport emissions for both gas and bio feedstocks.

To run PowerLCAT you have to download and install some free software called PsStudio. You might start by looking at the documentation (attached) because the heat rates are in Table 2 on page 3 and the emission factors are in an Appendix. Everything, including the PsStudio player, is downloadable from NETL's website link

The Upstream Dashboard is an Excel workbook that is attached. If you go to NETL's webpage and click on "Energy Analysis" / "search" and do an author search for Tim Skone you will find all this and some other interesting things, such as the coal/biomass cofiring paper that I have also included as an attachment.

I hope that helps. Let me know if you have comments or questions..

From: Ohrel, Sara
Sent: Thursday, July 25, 2013 8:57 AM
To: Creason, Jared
Subject: RE:

Hi,
Can you please send the link to the NETL website you use for this? Thanks

---

From: Creason, Jared
Sent: Wednesday, July 24, 2013 5:37 PM
To: Ohrel, Sara
Subject:

From:	Ohrel, Sara
To:	Jenkins, Jennifer; Sherry, Christopher; Epanchin, Pete
Sent:	7/22/2013 5:56:55 PM
Subject:	documents with tracked changes and comments for your records and reference
Attachments:	AF2 main body part2 7 22 SOv3.docx; AF2 main body part2 7 22 SOv3_changes saved.docx; AF2 main body_7 15 2013_PartI_CS.SO.PE.docx; AF2 main body_7 15 2013_PartI_CS.SO.PE_changessaved.docx; AF2 main body_7 15 2013_PartI_CS.SO.PE_Part 3 changessaved.docx; AF2 main body_7 15 2013_PartI_CS.SO.PE_Part 3.docx

These are the documents I used in today's drafts and edits I made today.
ES & Part I: I had edits atop of Pete's
Part 2 and 3: I edited atop of Pete's edits
Part 4: I only edited the landscape/process attributes section (as agreed to by Pete), added the updated table and a few other items to make the formatting flow a little better. Also, I left yellow highlighting (from Bill?) in this part for future reference.

Well done team!!
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Jenkins, Jennifer; Sherry, Christopher; Epanchin, Pete
Sent: 7/22/2013 5:49:37 PM
Subject: Draft accounting framework main report
Attachments: AF2 main body clean 7 22 13.docx

Hello Team Biomass,
Attached you will find the draft accounting framework main report. Though there are some areas that need further refinement and review, we have the major components included here for this milestone management review.
Best,
Sara

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Ohrel, Sara
Sent:	7/22/2013 5:00:33 PM
Subject:	backup
Attachments:	AF2 main body part2 7 22 SOv3.docx; AF2 main body part2 7 22 SOv3_changes saved.docx; AF2 main body_7 15 2013_Part3_SO.docx

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Epanchin, Pete
To: Ohrel, Sara; Sherry, Christopher
CC: Jenkins, Jennifer; Pete Epanchin
Sent: 7/19/2013 5:30:17 PM
Subject: RE: part II
Attachments: AF2 main body_5 17 2013_clean with comments_BI - aaf_SO 7 18v2_PEpart2.docx

Hi Team Biomass,
I have read and edited Sara's part 2 only up to 2.3.3 International Considerations.
I will continue to read it this weekend and will send it to you asap. In general, it is looking good so far. I am including the "issues" up to section 2.3.3 so, Sara, if you have a chance to address these, go for it. But don't take that as an order for you to work this weekend! ;)

Here are what I see as the big issues I was not able to resolve or :

Ex. 5 - Deliberative

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Ohrel, Sara
Sent: Thursday, July 18, 2013 7:57 PM
To: Sherry, Christopher; Epanchin, Pete
Subject: RE: part II

Hello gents,

Here is Part II. I went through all of it; however, there is one piece at the end of feedstock delineation that may need another set of eyes. Also, I didn't add text on fire Jen noted needed adding (as I was fixing the issue below); we can add text from AF1, if applicable, or add next round.

Please note: for some reason, as I was finishing working on this on the train, all text in all the comment bubbles starting with the baseline section was wiped out. I have never seen this happen before. All the bubbles remaining but the text and authorship disappeared. Luckily I had the last draft of the baseline section saved separately and just inserted that.

SO for leakage and the new section 3, I reinserted the authorship and text (from the most recent past version I had with Bill's comments) for those 2 sections (thank goodness it wasn't more or I would be up all night fixing it).

ALL is back in order, but just be careful! I think that either Word is freaking out due to all the tracked changes, my computer is freaking out, or something user error (but I have no idea what). When we put all the drafted sections back together, we need to watch of the blank ones in my doc.

Whoa, that was close.
Sara

From: Sherry, Christopher
Sent: Thursday, July 18, 2013 5:59 PM
To: Ohrel, Sara; Epanchin, Pete
Subject: RE: part II

OK, thanks – delayed in having all my Part I edits in – will have that tomorrow

---

From: Ohrel, Sara
Sent: Thursday, July 18, 2013 2:43 PM
To: Epanchin, Pete; Sherry, Christopher
Subject: part II

….will be coming to you when I land at home tonight (thanks for being amenable to that, Pete!)

Chris, here is some language on leakage for you:

Ex. 5 - Deliberative

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From: Ohrel, Sara
To: Ohrel, Sara
Sent: 7/17/2013 12:59:19 PM
Subject: af2 backup
Attachments: AF2 main body_5 17 2013_clean with comments (2) BI - aaf_SO 7 16.docx

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Santiago, Juan
To:	Ohrel, Sara
Sent:	6/26/2013 10:45:51 AM
Subject:	FW: Briefing on Forest Thinnings
Attachments:	ca carbon assessment usfs.pdf; Forest Thinning Power Point.pptx; thinCO2 (3).pdf

From: South, Peter
Sent: Wednesday, June 26, 2013 10:32 AM
To: Santiago, Juan
Cc: Dunkins, Robin; Koerber, Mike; Alston, Lala; Fruh, Steve; Culligan, Kevin
Subject: FW: Briefing on Forest Thinnings

Materials for today's meeting with NAFO.

From: Browne, Cynthia
Sent: Wednesday, June 26, 2013 10:29 AM
To: South, Peter
Cc: Knapp, Kristien
Subject: FW: Briefing on Forest Thinnings

Hey Pete,

Just received the attached from NAFO. Thanks, Cynthia

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Wednesday, June 26, 2013 10:22 AM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

Sorry it took so long!

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Wednesday, June 26, 2013 10:13 AM
To: Brittany Wynn
Cc: Knapp, Kristien
Subject: RE: Briefing on Forest Thinnings

Thanks, Brittany.

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Wednesday, June 26, 2013 10:11 AM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

Sorry it's taking me so long. Dave is currently in a meeting and I'm trying to get his attention.

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Wednesday, June 26, 2013 9:52 AM
To: Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Brittany,

May we get one electronic copy to forward it to our folks in North Carolina who will be calling in for this meeting.

Thank you, Cynthia

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Wednesday, June 26, 2013 9:50 AM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

Our phone system is still acting crazy. It was forward to my cellphone instead of my office phone.

So Dave is bring hardcopies of materials for everyone for the 10:30 meeting.

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Wednesday, June 26, 2013 9:48 AM
To: Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Oh no, Brittany, I called just this morning before I emailed.

Thank you, Cynthia

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Wednesday, June 26, 2013 9:47 AM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

Hi Cynthia,

If you left a voicemail yesterday, I didn't receive it because we were switching our phone system yesterday. I'll ask about any materials and/or presentations right away.

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Wednesday, June 26, 2013 9:45 AM
To: Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Brittany,

I called and left you a voicemail. Wanted to know if Dave had any materials/presentation for the briefing at 10:30 am this morning. We would like to share it with our folks who will be attending.

Thank you,

Cynthia Browne
Immediate Office of Air and Radiation
ARN Room 5406
U.S. Environmental Protection Agency
Email: browne.cynthia@epa.gov
Office: 202-564-7404

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Tuesday, June 18, 2013 9:50 AM
To: Browne, Cynthia; Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

Good morning. Thank you so much ladies.

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Tuesday, June 18, 2013 9:49 AM
To: Murphy, Tina; Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Brittany,

10:30 am on Wednesday, June 26th seems to be a favored time for us here at the EPA – I will be sending out an invite shortly.

Thank you, Cynthia Browne

From: Murphy, Tina
Sent: Tuesday, June 18, 2013 6:13 AM
To: Browne, Cynthia; Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Good Morning Ladies,

Yes, Wednesday, June 26th at 10:30 a.m. works for Sarah.

Thanks,
Tina Murphy

From: Browne, Cynthia
Sent: Monday, June 17, 2013 5:24 PM
To: Brittany Wynn
Cc: Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

Yeah, lets wait for Tina to confirm and then I will be happy to send a meeting invite and will indicate conference room, etc.

Thank you, Cynthia

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Monday, June 17, 2013 5:20 PM
To: Browne, Cynthia
Cc: Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

This works for Rob so I'll tentatively send this invite to him until we hear back from Tina. Will this be taken place in Mr. Goffman's office?

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Brittany Wynn
Sent: Monday, June 17, 2013 5:13 PM
To: 'Browne, Cynthia'
Cc: Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

Thanks for letting me know. I'll contact Rob and send you the response.

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Monday, June 17, 2013 5:12 PM
To: Brittany Wynn
Cc: Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

Thanks, Brittany, for the quick response. Lets make it 10:30 am. I will put a HOLD on Joe's calendar for now and wait for you to confirm.

Sarah Dunham, Director, Office of Atmospheric Programs, is located in another building on L Street. Tina takes care of Sarah's scheduling, so when you respond, please do a 'Reply All'.

Thank you, Cynthia

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Monday, June 17, 2013 5:05 PM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

10am would work for Dave and Chip. I'm not sure about Rob. Could we maybe make it tentative for now once I get in contact with Rob? Is Sarah Dunham in your office?

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630
Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Browne, Cynthia [mailto:Browne.Cynthia@epa.gov]
Sent: Monday, June 17, 2013 5:00 PM
To: Brittany Wynn
Cc: Murphy, Tina
Subject: RE: Briefing on Forest Thinnings

Hi Brittany,

I am hoping we can make something work for Wednesday, June 26th – how about sometime between 10:00 am and 12:00 noon?

Thank you,

Cynthia Browne
Immediate Office of Air and Radiation
ARN Room 5406
U.S. Environmental Protection Agency
Email: browne.cynthia@epa.gov
Office: 202-564-7404

From: Brittany Wynn [mailto:bwynn@nafoalliance.org]
Sent: Monday, June 17, 2013 4:56 PM
To: Browne, Cynthia
Subject: RE: Briefing on Forest Thinnings

Ms. Browne,

Good afternoon. Would you be the best person to reach out to set up a meeting with Mr. Goffman? Thank you.

Best,

Brittany

Brittany Wynn
Administrative Coordinator
National Alliance of Forest Owners
122 C Street N.W., Suite 630

Washington, DC 20001
Ph: (202) 747-0751 (direct)
Fax: (202) 824-0770
bwynn@nafoalliance.org
http://nafoalliance.org/

From: Dave Tenny
Sent: Monday, June 17, 2013 1:56 PM
To: Goffman, Joseph
Cc: Chip Murray; Rob.Olszewski@plumcreek.com; Browne, Cynthia; Dunham, Sarah; Brittany Wynn
Subject: RE: Briefing on Forest Thinnings

Ok. Brittany will work with your office to set up a time. Thanks, Joe.

David P. Tenny
President and CEO
National Alliance of Forest Owners
122 C Street, NW, Suite 630
Washington, D.C. 20001
Office: (202) 747-0739
Fax: (202) 824-0770
Cell: (703) 964-7519
dtenny@nafoalliance.org
www.nafoalliance.org

From: Goffman, Joseph [mailto:Goffman.Joseph@epa.gov]
Sent: Monday, June 17, 2013 1:54 PM
To: Dave Tenny
Cc: Chip Murray; Rob.Olszewski@plumcreek.com; Browne, Cynthia; Dunham, Sarah
Subject: Re: Briefing on Forest Thinnings

Great. Let's go for it. Thanks.

From: Dave Tenny
Sent: Monday, June 17, 2013 8:44:10 AM
To: Goffman, Joseph
Cc: Chip Murray; Rob.Olszewski@plumcreek.com
Subject: Briefing on Forest Thinnings

Hi, Joe – thanks again for the good call last Friday. As discussed, we would welcome an opportunity to brief you and any others you would like to bring in on modern thinning operations as they pertain to biomass feedstocks with a "de minimus" impact on atmospheric carbon concentrations.

Would you have some time next week for the briefing. Any day except for the 27th would work for us. Thanks, Joe.

Dave

David P. Tenny
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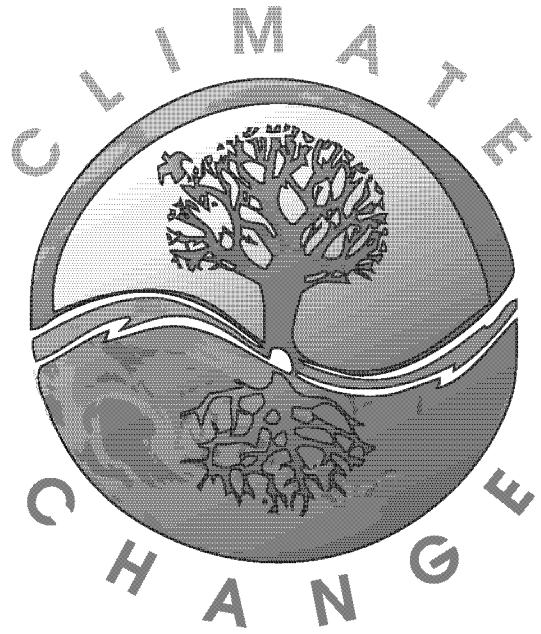
United States
Department of
Agriculture

January 2009

National Forest Carbon Inventory Scenarios for the Pacific Southwest Region (California)

REGION 5 CLIMATE CHANGE INTERDISCIPLINARY TEAM



REPORT SUBMITTED TO:

Randy Moore, *Regional Forester*
Pacific Southwest Region (Region 5)

Deanna Stouder, *PhD, Station Director*
Pacific Southwest Research and Experiment Station (PSW)

Table of Contents

Conveyance Memo

TO: Randy Moore, Regional Forester, Pacific Southwest Region, and

Deanna Stouder, PhD, Station Director-PSW Research Station

FROM: Bruce Goines, Team Leader, Pacific Southwest Region, and

Mark Nechodom, PhD, Co-Lead, Pacific Southwest Research Station

We are pleased to convey the findings of the Climate Change Interdisciplinary Team (CCIDT) in fulfillment of the Forest Service's commitment to assess the carbon benefit capabilities of the national forests in the Pacific Southwest Region over the next 100 years and to join California in meeting greenhouse gas reduction goals established under California's "Global Warming Solutions Act of 2006." The Team was composed of resource specialists and technical experts from the Region, and worked under the shared leadership of Cooperative Forestry and Research and Development.

In 2007, the 20.2 million acres of national forests in Region 5 held nearly 620 million tons of carbon in live tree biomass. By 2107 - depending on Forest Service management choices - the Region's national forests could either lose *or* gain several hundred million tons of carbon. The pathways to those outcomes might vary from creating highly resilient forests with fewer, larger trees; to overstocked forests with smaller trees and severe fires resulting in long-term losses of carbon and other values; to intensive management resulting in shifting millions of tons of carbon from the forests to wood products and bioenergy.

In order to examine these options, the Team developed six management scenarios in which changes in carbon inventories were quantified over a 100-year timeframe. In addition, the study determined the monetary value of the carbon inventories, using hypothetical market assumptions, and evaluated the feasibility of measuring non-market benefits, or ecosystem services, associated with the national forest management in California.

The six scenarios - projected over the next century - included: "Business as Usual" management practices that reflect current practices and performance; "Business as Usual" with an additional aggressive post-fire reforestation program; the full implementation of the Land and Resource Management Plans for each national forest,

as currently written and amended; and three scenarios with varying degrees of manipulation of stand structure to improve forest and stand resiliency to disturbance from fire, insects and disease and other factors. The modeling used readily-available growth and inventory data, combined with scientifically-based disturbance projections and staff expertise in forest resource management costs, practices and principles.

Ecosystem integrity, biodiversity, water quality, air quality, public health, property values, aesthetic values and a host of other resource values are tied to the resiliency of forests over time. The Team's rapid assessment raises significant questions regarding sustainability of national forest ecosystems under current management practices and program levels. It also poses important challenges to the Forest Service and its partners as all interests consider the long-term implications of federal management choices.

KEY FINDINGS:

The national forests in California will become net emitters of carbon by the end of the century. For the next 4-6 decades, under a Business as Usual (BAU) trajectory, the national forests will accumulate carbon at a higher rate than carbon will be lost through disturbances such as wildfire, pest mortality and inter-tree competition. However, at some point in the mid-21st century, losses from wildfire, disease and other disturbances will exceed growth. National forest carbon sinks will become unstable and unsustainable, under the BAU scenario.

Achieving high levels of carbon sequestration may be incompatible with other resource objectives. For example, the Maximum Forest Resiliency (MaxFR) scenario would reduce canopy cover below current Forest Plan requirement for some forest types, and may not be compatible with the maintenance of other multiple resource values.

Substantial levels of investment in management will be required for systemic, long-term carbon returns. This includes significant investments in post-fire reforestation and pre-fire thinning operations. Given the history of national forest management in the United States, nearly all future management strategies will be increasingly costly, whether driven by fire suppression, vegetation management or intensive protection of high-value resources on the landscape.

The sustainability of the Region's national forest carbon sinks over the next 100 years will depend on increasing the effectiveness of fire and forest health management strategies. Current management levels (modeled under the BAU scenario) will not achieve the level of improvement in forest health or the reduction of wildfire effects presumed by current policy direction.

RECOMMENDATIONS:

1. **A national-level team should extend this assessment to include wildfire emissions, bioenergy benefits, other carbon pools, ecosystem services values and a comprehensive economic assessment.** Further, that team should be charged to develop optimal strategies and investments to ensure stability and resiliency of the natural systems under our jurisdiction. This would require significant investment of staff and analytical capacity, and would likely require an extended commitment of a small number of professional and scientific experts.
2. **This analysis should be used as an opportunity to engage the public and the Forest Service's strategic partners in meaningful dialogues about the long-term implications of management activities on our national forests.** The Team's findings raise profound questions about trade-offs between near-term benefits and long-term consequences that must be addressed as public policy questions and choices.

We are proud of the work the Team was able to produce within the given constraints of time and resources. And we appreciate your willingness to invest time and resources in the overall understanding of carbon benefits from forests that is currently evolving in California. We hope this assessment will provide a cornerstone for building and extending the kinds of analyses that will meet the national scope of the challenges ahead.

R5/PSW Climate Change Interdisciplinary Team (CCIDT) Members

Team Leaders

Bruce Goines, Cooperative Forestry (Team Leader)

Mark Nechodom, PSW Research Station (Co-Lead)

Team Members:

Klaus Barber (FIA/Modeling), Regional Office - McClellan

Brad Burmark (Planning/Economics), Regional Office

Scott Conway (Fire/Fuels), Tahoe National Forest

Chris Fischer (Silviculture/Editor), Regional Office

Karen Jones (Fire/Fuels), Tahoe National Forest

Mike Landram (Silviculture/Planning), Regional Office

Martha Maciel (Public Affairs), Regional Office - Sacramento

Nancy Mulligan (Silviculture/Timber Management), Mendocino National Forest

Gary Thompson (Fire Ecology), Regional Office

Tony Tooke (Integrated Vegetation Management), Washington Office

Acknowledgements

This project and report are products of many hands. Beyond the Team members and authors already listed, there are several who contributed advice and analysis deserving of our sincere thanks.

The challenging task of justifying our assumptions about disturbance regimes, past and future, was unstintingly supported by our colleagues of the Stewardship and Fireshed Assessment program at McClellan: Jay Miller, JoAnn Fites-Kaufmann, Berni Bahro, Joe Sherlock, Laurie Perrot, Nathan Amboy and Tanya Kohler. The imagination and skill is theirs; the errors are ours.

A tough but friendly review was joined by several top experts, including: Rich Birdsey, Jeremy Fried, Matt Herteau, Chris Keithley, Max Moritz, Malcolm North, Tim Robards, Bill Stewart, Laurie Tippin, Tony Tooke and Doug Wickizer. While we may not have answered their tough questions adequately, we are doubtless improved because of them.

The Forest Service's Washington Office Policy Analysis team provided valuable help and feedback, probably increasing our intelligibility quotient immeasurably: Bill Lange, Duncan McKinley and Erin Uloth.

We are also much indebted to the indirect, but nonetheless influential, contributions of our colleagues serving on the California Climate Action Registry's Forest Protocol Technical Working Group, led with inimitable focus and aplomb by John Nickerson. If there is rubber on the tires, and should there be a road ahead, this is where they will meet.

Executive Summary

California has become a national leader in meeting the challenges of climate change and in determining the roles of forests in reducing atmospheric greenhouse gases. California's Global Warming Solutions Act, known as Assembly Bill 32 (AB 32), requires statewide greenhouse gas (GHG) reductions to 1990 levels by 2020, with an additional reduction of 80% of 1990 levels by 2050 through an Executive Order (ES-03-05) of the Governor. The California Air Resources Board (ARB) is the lead regulatory and policy body charged with developing rules, protocols and policies to meet those targets.

California's forests and rangelands will play an important role in sequestering carbon and helping the state meet its greenhouse gas emissions reduction goals. Forests and rangelands in California, nearly half of which are on national forest lands, store a large quantity of terrestrial carbon in living biomass, standing and downed woody debris, duff, litter and soil organic carbon. Forest management can affect inventories of stored carbon by manipulating stand structure, composition, growth rates, and influencing the frequency, size and severity of natural disturbances that would reduce carbon inventories. Forest products also provide climate benefits by storing carbon in wood products, and by offsetting fossil-fuel energy as a source of carbon-neutral bioenergy for heat and electricity. Additional benefits may be measured because of substitution of wood for more energy intensive building products.

California state law requires AB 32's rules and regulations to be ready for implementation by January 1, 2010. Over the past two years, several state agencies, the Forest Service, University based researchers, a number of Non-government Organizations, and California's industrial and privately owned forestry leaders have been deeply involved in developing the policy framework and estimating potential contributions of forest lands to achieve targeted reductions.

In February 2008, the Pacific Southwest Regional Forester and the PSW Station Director assembled a Climate Change Interdisciplinary Team (CCIDT) to evaluate the potential for national forest lands in California to play a role in meeting AB 32 goals, in addition to supporting climate change mitigation and adaptation efforts. The Team - comprised of specialists from State and Private Forestry, Research and Development and National Forest System - was chartered to utilize best available data, science and modeling techniques to complete a rapid assessment of carbon sequestration capabilities and associated costs on the national forests in California. This report represents the Team's findings. The following findings and recommendations conclude that additional analyses and scenarios may be appropriate in order to stimulate broad policy discussions and decisions.

The Team estimated carbon inventories and modeled growth and disturbance under six management scenarios over a 100 year period. Carbon inventories were benchmarked against the official AB 32 reference years of 1990, 2020 and 2050. The scenarios were designed to represent a range of management approaches, including intensities of forest stand manipulation and levels of investment. Modeled carbon inventories were expressed in millions of metric tons of carbon dioxide equivalent (MMTCO2e) in three major pools: 1) above ground live biomass, 2) harvested wood products, and 3) bioenergy (i.e., non-merchantable biomass that could be converted to renewable heat, power and biofuels, and are considered "carbon neutral").

These carbon pools were selected to serve as indicators of carbon values associated with the various management scenarios. Additional carbon pools such as below ground biomass, soil carbon, duff and litter, above ground dead biomass were not selected for modeling in this report, but should be included in a subsequent assessment. Although the carbon accounting procedures for UN Framework Convention on Climate Change and Kyoto protocol exclude carbon stored in wood products, California's ARB is currently considering whether and how to account for the carbon benefits of long-lived forest products and energy derived from renewable fuels. Because of these active deliberations, and the fact that this analysis can inform policymakers on real, measurable and verifiable carbon pools in the forestry sector, the Team decided to include carbon sequestration in solid wood products and immediate offsets of emissions from renewable energy resources. Other carbon accounting challenges, such as bioenergy and substitution of solid wood products are currently being debated in policy forums.

It is important to note that wildfire emissions - potentially a major source of carbon flux on national forest lands - were not measured or modeled in the initial assessment. While reviewers urged the Team to analyze emissions from all disturbances - such as wildfire and significant die-back from insects and disease - the Team determined that the modeling requirements would far exceed the limited resources available.

This study was designed as a rapid, macro-level assessment of forest carbon inventories, values, and implementation costs under six management alternatives modeled over 20 million acres of California's national forest lands using the best available data and modeling techniques. Regional growth and disturbance models were applied using Forest Inventory and Analysis (FIA) data, contemporary research and expert judgment of scientists and practitioners familiar with California's forests. The results reflect general projections rather than site-specific predictions of growth and disturbance, and display the key resource impacts of alternative management approaches. Precise modeling of unique vegetative types was beyond the scope of this analysis, and was constrained by a dearth of peer-reviewed research and scientific consensus on modeling disturbance in complex forest ecosystems.

MANAGEMENT SCENARIOS

Six scenarios were developed to depict a range of hypothetical approaches, designed to evaluate how different management regimes might affect forest growth and disturbance, expressed in terms of carbon storage and loss. The costs, revenues, acres treated and resulting carbon inventory volumes are reasonable estimations developed for this analysis only. They are not intended to be realistic or achievable within the current organizational, budgetary or regulatory environment. Each scenario is measured against a 1990 inventory reference point to assess the contributions of national forest lands to AB 32's goal of statewide greenhouse gas (GHG) reductions to 1990 levels by 2020, and 2050, and out to 2110.

Brief descriptions of the modeled scenarios follow, with more detailed descriptions found in the body of the report and in the appendices:

Business as Usual (BAU): The Business as Usual scenario is a projection of existing trends in management activities, budgets, workforce and anticipated social constraints. The scenario conforms to the Standards and Guidelines published in the Region's existing Land and Resource Management Plans (LMPs), but assumes a much reduced management accomplishment level compared to the number of acres identified in the official LMPs for each national forest in the Region. This reflects current reality in national forest management in California.

Land and Resource Management Plan (LMP): This scenario is a projection of management activities on the Region's national forests as described in existing LMPs, assuming that they are completed as written and amended and authorized with unconstrained budgets and workforce.

Intensive Even-Age Management (IEAM): This scenario is a simplified projection of an even-age, regulated forest management regime on a 70 year rotation, and maximizes carbon sequestration by replacing a stand of trees when it has reached culmination of mean annual increment (CMAI), or the maximum *annual rate* of carbon sequestration. It is a rough proxy for "Option C" for private industrial forest land management under the California Forest Practices Act. Option C is currently used to establish baseline under the California Climate Action Registry (CCAR) protocols as adopted by the California ARB in December 2007. In other words, this is the "business as usual" presumption applied to projects under the CCAR protocols as they were originally written in 2005.

Minimize Canopy Disturbance (MinCD): The Minimize Canopy Disturbance scenario (MinCD) is based on retaining standing carbon inventory in trees larger than 20" DBH (diameter at breast height) and maintaining high-density canopies as required under current Forest Plans for the Sierra Nevada. Under this scenario, management activities are designed to reduce surface and ladder fuels and retain

carbon inventory in larger trees. Management activities are limited to hand or mechanical treatments that remove trees likely to be killed by a moderate fire (5-foot flame lengths) and to a follow-up prescribed underburn to reduce ground fuels. Purposeful reductions in existing canopy cover would be minimal.

Maximum Forest Resiliency (MaxFR): The MaxFR scenario removes suppressed intermediate and co-dominant trees up to 30" DBH, retains the most vigorous trees and reduces canopy cover to not less than 35%. Treatments are followed by underburning (or prescribed fire) to remove surface fuels. Acres burned to a deforested condition are assumed to be reforested within the decade following a wildfire event.

BAU Plus Reforestation (REFOR): This scenario was developed to model aggressive reforestation after wildfire. The REFOR scenario models reforestation on all acres deforested by wildfire, while maintaining the same management levels modeled under the BAU scenario.

FINDINGS AND RECOMMENDATIONS

1. Carbon sequestration under the "Business as Usual" (BAU) scenario will outpace losses to wildfire, pest, drought, and inter-tree competition for the next 4-6 decades. However, at some point in the mid-21st century, carbon losses (from wildfire, disease and other disturbance) overtake growth. The Region's national forests will become net emitters of carbon during the latter half of the 21st century under the BAU scenario.
2. The sustainability of the Region's forest carbon sink in the next 100 years is largely dependent upon the frequency and the extent of wildfire, and the effectiveness of forest health management strategies.
3. The precision of forest carbon measurements and predictions of future carbon inventories are extremely limited at large scales because of uncertainty in current inventories, and particularly in forest ecosystem components that have not been historically measured.
4. Long-term increases of carbon inventories in California's national forests will depend on the establishment of forest ecosystems that are resilient to increasing disturbance under anticipated changing climate regimes.
5. Maximum carbon sequestration is not always compatible with other resource objectives. Some trade-offs in other ecosystem values, including habitat and recreation qualities, may be required to maximize national forest carbon sequestration capabilities.
6. Assessments of the roles of forests in climate regulation and mitigation must include consideration of sequestration of carbon in forest products and the reduced carbon emissions associated with bioenergy produced from forest biomass.

The following two figures synthesize the modeled carbon inventories for the six scenarios. Figure 1 depicts inventories of the three major carbon pools modeled in this study: 1) above ground live biomass, 2) harvested wood products, and 3) biomass converted to renewable heat, power and bio-fuels. Figure 2 depicts above ground live biomass only.

Note that there are substantial differences in inventory, relative to the 1990 baseline, between Figures 1 and 2. Figure 1 shows a much higher level of total carbon inventory because both harvested wood products and bioenergy are included in the total amount of carbon tonnage counted.

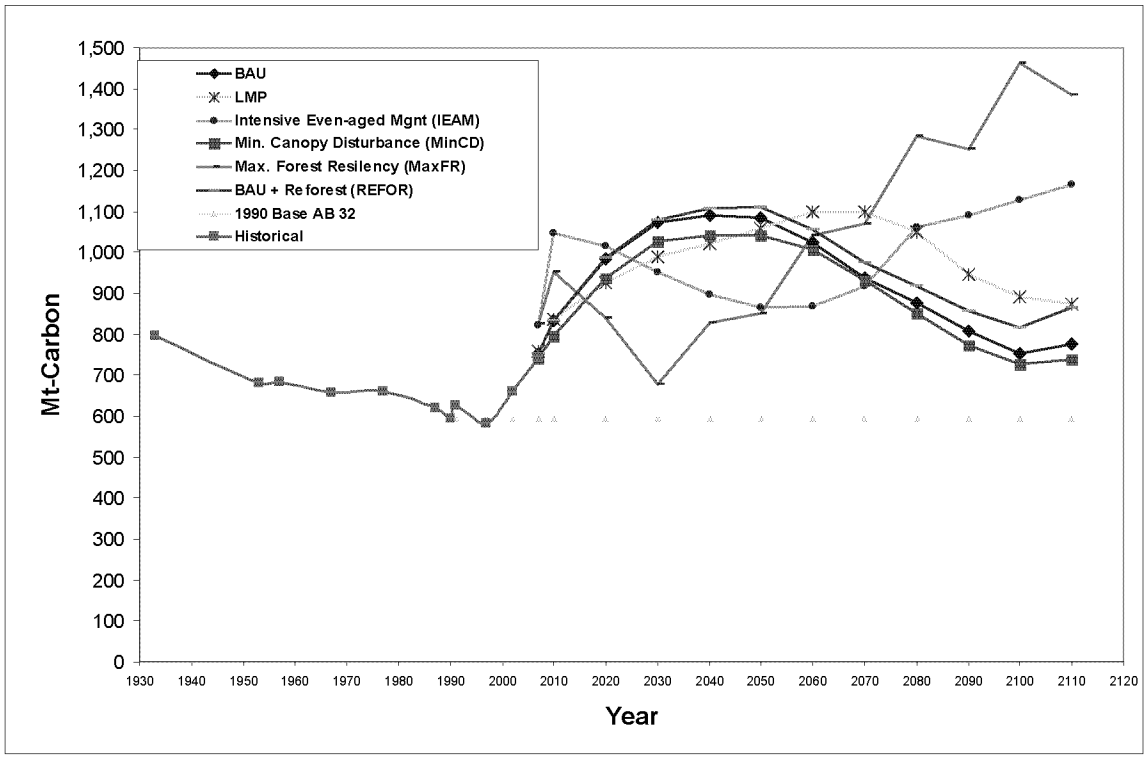


Figure 1 - Projected changes in Carbon inventories *including wood products and biofuel substitution*

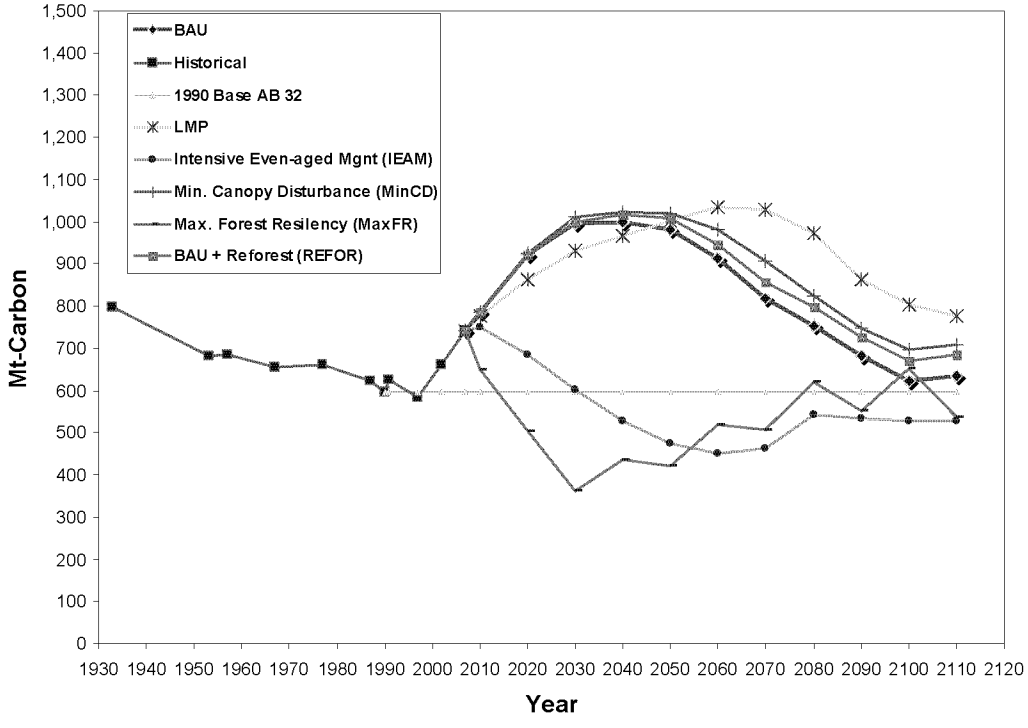


Figure 2 - Projected changes in Carbon inventories of *Above Ground Live Biomass Only*

further interpretations of each scenario are included in the analysis and discussion below, with detailed descriptions of the modeling assumptions for each scenario in the appendices.

Introduction and Context

Forest systems are an integral component of global carbon cycles. Forest growth and disturbance also represent the sequestration and release of carbon. This report is an assessment of U.S. Forest Service Pacific Southwest Region 5 lands capability to sequester carbon under a range of forest management and disturbance scenarios. It was designed as a quick assessment using best available information, and does not represent a final analysis for management consideration. This report serves to better understand carbon cycle implications of different approaches and intensities of forest management and to identify areas of opportunity for further analysis.

RELATIONSHIP TO CALIFORNIA GLOBAL WARMING SOLUTIONS ACT-ASSEMBLY BILL 32

This analysis was developed in parallel with the state of California's efforts to significantly reduce the greenhouse gas emissions for all sectors in the state. California's Global Warming Solutions Act, known as Assembly Bill 32 (AB 32), requires statewide greenhouse gas (GHG) reductions to 1990 levels by 2020. In addition, by Executive Order ES-03-05, Governor Schwarzenegger ordered additional reductions to 80% of 1990 levels by 2050. The California Air Resources Board (ARB) is the lead regulatory and policy body charged with convening interests, scoping sources and potential sinks, formulating the strategy to achieve the mandated reductions and developing rules, protocols and policies to meet those targets. State law requires those rules and regulations to be ready for implementation by January 1, 2010.

In analyzing greenhouse gas sources and sinks, California's forests and rangelands were identified as an important sector capable of sequestering additional carbon and helping the state meet their greenhouse gas emissions reduction goals. These forests and rangelands, nearly half of which are on national forest lands, store a large quantity of terrestrial carbon in living biomass, standing and downed woody debris, duff, litter and soil organic carbon. Forest carbon inventories are directly affected by management activities and by levels of disturbance from fire, insects and diseases and other factors that affect forest inventories. Forest growth and disturbance levels are affected by manipulating stand density, age, species composition, amount and location of ground and ladder fuels, and, by influencing the frequency, size and severity of natural disturbances that would reduce carbon inventories. Harvested forest products provide climate benefits by storing carbon in wood products, and providing a source of carbon-neutral energy in the form of heat and electricity. Wood

products also provide climate benefits by serving as a substitute for more energy-intensive building products.

A great deal of analysis is being performed to determine the capability of California's forests to contribute to AB 32 goals. Several California state agencies, the forest products industry, university researchers, a number of land conservation non-governmental organizations (NGOs) and the Forest Service have been deeply involved in developing the policy framework and estimating forest lands' potential contributions for targeted reductions.

AB 32 Scoping Plan

In October 2008, the state of California produced a Proposed Scoping Plan target for California's forest sector. This plan proposed that the forest sector maintain the current 5 Million Metric Tons of CO2 equivalent (MtCO2e) per year of sequestration through 2020. This would be achieved by continuation and enhancement of sustainable forest management practices, including reducing the risk of catastrophic wildfire, and the avoidance or mitigation of land-use changes that reduce carbon storage. The scoping plan also recognizes the importance of promoting sustainable forest management, conserving biodiversity, providing recreation, and other benefits associated with sustainable forest management. California's Board of Forestry and Fire Protection has the authority to provide for sustainable management practices on private forest lands, and has committed to the maintenance of current carbon sequestration levels on private forest lands where feasible.

The 5 MMTCO2E emission reduction target through 2020 is equal to the magnitude of the current estimate of net emissions from California's forest sector. It is recognized that data and inventories are less than optimal, and that as technical data improve the target can be recalibrated to reflect new information. The scoping plan recognized California's forests could play an even greater role in reducing carbon emissions for the 2050 greenhouse gas emissions reduction goal, and that forests are unique in that planting trees today will maximize their sequestration capacity in 20 to 50 years. Near-term investments in activities such as planting trees will help California reach the 2020 target, but they will also play a greater role in reaching the 2050 goals.

The scoping plan recognizes the formidable presence of public forest lands in California. Although public lands are managed primarily under federal statute, the scoping plan states that "the federal government must also use its regulatory authority to, at a minimum, maintain current carbon sequestration levels for land under its jurisdiction in California." Recognizing that the state has an advisory role in federal land management, this statement nonetheless underscores the potential importance of all forest lands in addressing greenhouse gas goals.

The Pacific Southwest Region's Regional Forester and Research Station Director recognized the important role of the Forest Service in this analysis, and the important contributions California's public forest lands can make to long-term greenhouse gas management goals. Recognizing the need to articulate Forest Service lands contributions in January of 2008, the Pacific Southwest Region and Research Station assembled a Climate Change Interdisciplinary Team (CCIDT) to help analyze the agency's potential contributions to California's greenhouse gas mitigation goals. This Team, comprised of specialists from State and Private Forestry, Research and Development and National Forest System was chartered to utilize best available data, science and modeling techniques to complete a comprehensive assessment of carbon sequestration capabilities, cost, timeframes, and non-market benefits on the national forests in California. Further, in direct support of AB 32 the Team developed a set of carbon accounting principles that could be applied to public land forestry. This report presents information to the Regional Forester and Station Director on forest management opportunities for increasing forest carbon pools and assesses potential national forest participation in California Global Warming Solutions Act and the California Climate Action Registry.

SCENARIO DESIGN

The CCIDT evaluated a variety of management scenarios to understand the carbon sequestration benefits public forest lands could provide under the California Global Warming Solutions Act (AB 32). The scenarios were designed to evaluate how different management approaches would affect forest growth and disturbance, expressed in terms of carbon storage and loss. The range of scenarios evaluated represents a spectrum of approaches. Other than the Business as Usual (BAU) scenario, the BAU with additional emphasis on reforestation of deforested areas, and possibly the Land Management Plan scenario, the scenarios are simply benchmarks designed to stimulate thinking on how different approaches would affect disturbance and inventory. The costs, revenues, acres treated and volumes are reasonable estimations developed for this analysis only, but are not realistic nor necessarily achievable within the current organizational, budgetary or regulatory environment. Each scenario is measured against a 1990 inventory reference point to assess forest service lands contributions to AB 32 goals of statewide greenhouse gas (GHG) reductions to 1990 levels by 2020 and 2050.

Detailed descriptions of scenarios are as follows:

Business as Usual (BAU): The Business as Usual Scenario is a projection of existing trends in management activities, budgets, workforce and anticipated social constraints. The BAU scenario conforms to the Standards and Guidelines within the

existing Land and Resource Management Plans (LMPs), but does not treat the number of acres in the fashion identified under LMPs.

Forest Land and Resource Management Plan (LMP): A projection of management activities in all national forests implied in existing LMPs completed with unconstrained budgets and workforce. It approximately doubles treatment areas in BAU and conducts more intensive stand management and more follow up fuel hazard reduction treatments.

Intensive Even-Age Management (IEAM): Projects an even-age, regulated forest on a 70 year rotation. This scenario maximizes carbon sequestration by replacing a stand of trees when it has reached culmination of mean annual increment (CMAI) in carbon production and is a rough proxy for California Forest Practices Act Option C forest management approach that serves as a baseline for accounting for carbon values under AB 32 Forest Conservation Management projects.

Minimize Canopy Disturbance (MinCD): The Minimize Canopy Disturbance Scenario (MinCD) is based on retaining carbon inventory in trees larger than 20" DBH and retaining high canopy densities. Under this scenario, management activities reduce surface and ladder fuels and retain the carbon inventory in larger trees. Management activities would be limited to hand or mechanical treatments that remove trees that would be killed by a moderate fire (5' flame length) and to a follow-up prescribed fire, to reduce ground fuels. Reductions in existing canopy cover would be minimal.

Maximum Forest Resiliency (MaxFR): The MaxFR scenario vigorously thins and removes suppressed intermediate and co-dominant trees up to 30" DBH, retains the most vigorous trees and opens canopies up to 35% canopy cover. These management activities reduce canopy closure to the point that crowns are for the most part not touching. Treated acres are followed by prescribed burning to remove surface fuels. Lands that are burned into a deforested condition are reforested.

BAU Plus Reforestation (REFOR): This REFOR scenario reforests areas that are burned in wildfire to a deforested condition, exceeding the reforestation acres analyzed in the BAU scenario. This scenario reforests nearly all areas burned into a deforested condition by wildfires, and achieves reforestation of 50,000 acres of the 136,162 acres of current reforestation need.

COMMONALITIES AMONG SCENARIOS

Each scenario shares key commonalities in the land area modeled and the data sources for vegetation and disturbance. Assumptions specific to each scenario are

detailed further in the report. The following parameters are common among all scenarios:

1. Total carbon inventories are calculated on 20.2 million acres, which comprises all national forest lands in California (i.e., Region 5 excluding the Pacific Islands).
2. Scenarios assume management activities are implemented on 10.7 million of the total 20.2 million acres in the analysis area. The managed land base is defined as those productive national forest lands within the Region that are *not* withdrawn from management by Congress or the Secretary of Agriculture (such as wilderness areas or other administratively withdrawn lands).
3. The inventory source data are derived from US Forest Service Forest Inventory and Analysis (FIA) databases, and are supplemented by additional databases managed by the Region 5 Remote Sensing Lab.
4. Modeled carbon inventories are expressed in millions of metric tons of carbon dioxide equivalent (MtCO2e) in three carbon pools: above ground live biomass, harvested wood products, and non-merchantable biomass that could be removed and converted to heat or electric power.
5. Below ground live biomass, duff and litter, standing dead and down material, and soil organic carbon pools are not modeled for this analysis, given limitations and inconsistencies of data across the analysis area.
6. The range of practices modeled in this analysis include:

Site preparation	Regeneration harvesting without reserved trees.
Tree planting	Prescribed burning
Natural Regeneration	Wildland Fire Use
Conifer release	Fuelbreak construction and maintenance
Pre-commercial thinning	Pruning
Commercial Thinning	Hardwood management
Salvage harvesting	Group selection
Regeneration harvesting with reserved trees.	

Carbon Capacity Capabilities Assessment by Scenario

The following section provides detailed descriptions of the management activities, modeling assumptions, modeling results, management regimes and disturbance conditions for each of the scenarios modeled for the study. Each section provides:

7. Description of the management activities and costs;
8. Description and justification of modeling assumptions;
9. Estimated carbon sequestered and stored in the Baseline year (2007), and subsequently in 2020, 2050, and 2110;
10. Economic analysis displaying scenarios costs, net present value estimates and the potential market value of the carbon stored under each scenario.

BUSINESS AS USUAL SCENARIO (BAU)

Management Activities and Costs

Business as Usual Scenario is a projection of existing trends in management activities, budgets, workforce and anticipated social constraints. BAU scenario conforms to the Standards and Guidelines within the existing Land and Resource Management Plans (LMPs), but does not treat the number of acres in the fashion identified under LMPs.

The BAU projected curve represents the continuation of integrated vegetation management (IVM) activities on an average of 93,600 acres per year which includes reforestation of an average of 8,600 acres/year. The integrated vegetation management footprint represents management of slightly less than .5% of the 20.2 million acre Forest Service land base per year. Harvested volumes represents removal of ~.2% of annual growth. Essentially stands are adding inventory and continuing to age.

Reforestation figures were determined by surveying past program accomplishments. Most reforestation activity has been performed on lands burned to a deforested condition by wildfires, however some regeneration has occurred on areas harvested under the Northwest Forest Plan (NWFP 1994). The 7-year average annual number of acres burned into a deforested condition is 23,943 and the 5-year average of all acres planted is 8,600. Wildfire deforested acres are surveyed by Forest Service staff and are deemed to be capable of "recovering naturally" through natural seeding, and not

in need of planting, or are identified a "reforestation need" and in need of planting. These determinations are consistent with Forest Service policy and direction. Reforestation need acres are currently accumulating each year because of wildfire-driven deforestation. Currently, 136,162 acres are in need of reforestation, not including areas burned in 2008.

Integrated vegetation management treatments are designed to produce a desired change in vegetative composition, stand densities, improve forest health, resistance to drought, insects and diseases, aging stands, and to compliment and enhance other resource values. These IVM treatments can span more than one fiscal year: such as thin from below and under burn. Each treatment can accomplish one or more established Forest Service targets: such as wildlife habitat improvement and fuel hazard reduction. One or more budget line items (BLI) can be used to fund the accomplishment of the vegetation treatments. An average of 93,600 acres per year has been treated in the last 5 years, representing less than .5% of the land base.

Table 1 provides estimates of harvest volumes and associated costs to implement vegetation management under BAU. Costs were derived from an analysis of Forest Service Region 5 funds spent on IVM treatments during fiscal years 2003-2007.

Table 1 - BAU Harvest Volumes and Costs by Decade

Decade	Volume Harvested MMBF Average Annual	Acres of Reforestation In IVM Average Annual	Acres Integrated Vegetation Management* Average Annual (x 1,000)	Cost of IVM $MM Average Annual
2007-2009	371	8,600	93.6	119
2010- 2019	389	8,600	93.6	119
2020-2029	442	8,600	93.6	119
2030-2039	479	8,600	93.6	119
2040-2049	505	8,600	93.6	119
2050-2059	505	8,600	93.6	119
2060-2069	480	8,600	93.6	119
2070-2079	443	8,600	93.6	119
2080-2089	386	8,600	93.6	119
2090-2099	352	8,600	93.6	119
2100-2109	331	8,600	93.6	119
2110-2119	328	8,600	93.6	119

* Includes reforestation acres

Modeling Assumptions

BAU models were developed by first looking at past forest inventories and updating all plots to 2008 in order to normalize to a common inventory. Using Forest Vegetation Simulator (FVS) (Ritchie, 1999), the Team modeled forest inventory growth for the next 100 years using the FIA and R5 inventory plots. The projected inventory growth from FVS was very close to being linear and growth rates declining slightly. During the last 50 years of the analysis most forest vegetative types will reach culmination of mean annual increment and growth rates will begin slowing. As the FVS does not model the effects of catastrophic mortality, such as wildfire, insect and disease outbreaks and drought, all of which are predicted to increase, this continuing accumulation of volume was determined to be unachievable and most likely inaccurate. Natural disturbances from wildfire, insects and diseases currently impact approximately 3% of lands not withdrawn from management each year, and are predicted to increase in the modeling of this alternative. Data supporting the growth and disturbance modeling performed for this scenario includes: predicted increasing trend in wildfire acres and severity, as current USFS data show (Miller et al., 2008, Westerling et al., 2006), expected increase in pest mortality based on past precipitation and mortality trends (CA Forest Pest Council, 2007), increase in pest risk (25% or greater loss of basal area in next 15 years) based on stand densities, precipitation and other forest parameters (USDA Forest Service, 2007), minimal reforestation of areas burned into deforested condition (USDA Forest Service Pacific Southwest Region Reforestation Trends 2008), a direct relation between the amount of biomass/fuels being accumulated and the number of acres and severity of wildfire. (Sugihara et al., 2006)

The Team used SPECTRUM and FELDSPAR (FOR PLAN) models to incorporate these natural disturbance regimes and trends described above into the modeling process. FIA plots, R5 densified inventory plots, USFS fire history and mortality data were used as inputs to the model.

A more detailed description of the methods used to develop the BAU Scenario is contained in Appendix A.

Estimated Carbon Sequestered

Carbon stocks in above ground live biomass are projected to increase in the next 30 to 40 years with growth exceeding loss due to wildfire, insect and disease, and drought. At this point the disturbance agents will exceed growth, causing above ground live biomass inventories to decline, carbon storage will crest and then decline.

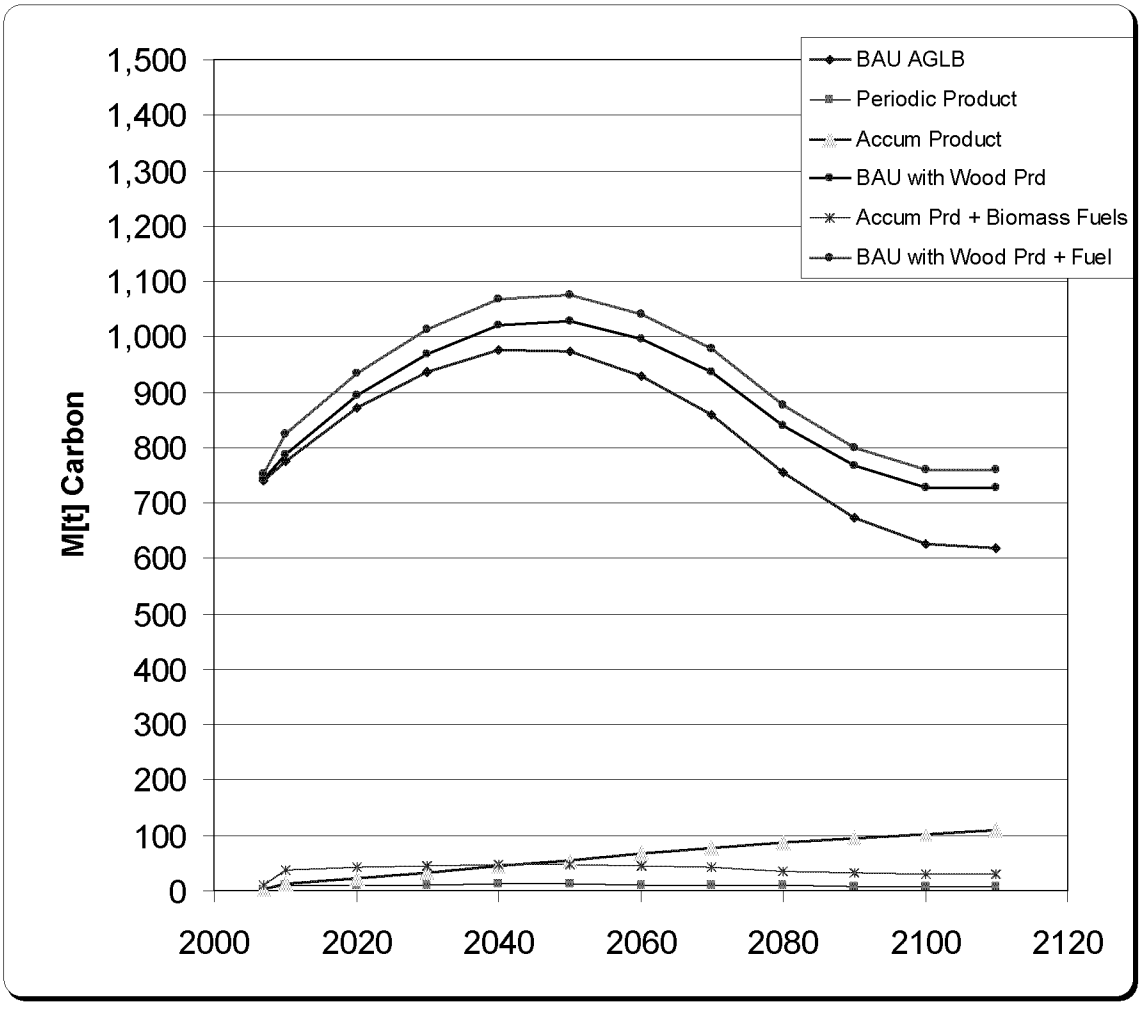


Figure 3- Carbon Inventory for "Business As Usual" Scenario (BAU)

Table 2 - BAU Modeled carbon inventories in 1990, 2020, 2050 and 2110 expressed in Million metric tons of C02 equivalent

Carbon Pool	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	872	973	619
Above Ground Live Biomass + Wood Products	595	893	1028	728
Above Ground Live Biomass + Wood Products + Non Merchantable Biomass	595	935	1076	759

Discussion

The BAU scenario indicates a general increase, peak and then declining pattern for live biomass carbon inventory. Between 1990 and 2020, the above ground live biomass carbon inventory rises from ~595 MtC to ~872 MtC on the 20.1 million acres of NF lands, sequestering slightly over 9 MtC per year. Between 2020 and 2050 the above ground live carbon inventory rises to 973 MtC averaging slightly over 3 MtC per year. Between 2050 and 2110 forests are modeled to become a net carbon emitter, emitting nearly an average of 6 MtC per year.

Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to renewable heat, power and bio-fuels, changes the projections of carbon storage; however, sequestered carabon still follows the same general decreasing trend. Wood products add approximately 140 MtC over the century.

Overall, the BAU scenario modeling indicates that as national forests continue to grow over the next 30-40 years they will serve as a significant sink for atmospheric carbon. Eventually, as stands age, growth rates slow, and disturbance continues, forests will begin to emit stored carbon back into the atmosphere.

LAND AND RESOURCE MANAGEMENT PLAN SCENARIO (LMP)

Management Activities and Costs

The Land and Resource Management Scenario (LMP) is based on following the activities implied in each national forest's land management plan given unconstrained budget, workforce and social restrictions.

The LMP curve represents integrated vegetation management treatments averaging 220,750 acres per year as determined in each Forest's LMP. Similar to the BAU scenario, integrated vegetation management treatments are designed to produce a desired change in vegetative composition, stand densities, improve forest health, resistance to large catastrophic fire, drought, insects and diseases, and to compliment and enhance other resource values. Under the LMP scenario, lands that are burned into a deforested condition are reforested.

Management activities under this scenario remove approximately 0.22% of annual growth per year for the first three decades (~2.2% per decade), declining to approximately 0.08% per year by year 2110 on productive forest lands. The projected changes in inventory are based on each Forest Plan's Final EIS, except for the Southern California Province Forests, where there is no implied schedule of treatments in the Plans.

See Appendix C for a listing and description of the activities.

Table 3 - LMP Harvest Volumes and Costs by Decade

Decade	Volume Harvested MMBF Average Annual	Acres Integrated Vegetation Management* Average Annual (x 1,000)	Cost of IVM $MM Average Annual
2007-2009	496	191	243
2010-2019	478	194	247
2020-2029	425	227	289
2030-2039	294	206	262
2040-2049	188	214	272
2050-2059	201	226	288
2060-2069	219	211	269
2070-2079	200	229	292
2080-2089	244	243	309
2090-2099	237	239	304
2100-2109	245	234	298
2110-2119	274	235	299

* Includes reforestation acres

Modeling Assumptions

The LMP carbon inventory curve is based on SPECTRUM and FELDSPAR analysis used in the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement (SNFPS) and the Northwest Forest Plan (NWFP). The volume estimates in the current LMPs, except the Southern California Province Forests, were projected using the current inventory from FIA and RSL plot data under management goals and objectives outlined in the SNFPS and NWFP. The increasing effects of wildfire intensity and size included in the BAU scenario were not included in this projection as implementation of treatments that meet Forest Plans were assumed to reduce acres burned by 20-40 percent and severity by 70-80 percent (USDA Forest Service, 2004).

Estimated Carbon Sequestered

The LMP curve shows a trending increase in carbon resulting from land management treatments that reduce the threat of catastrophic wildfire, modify fire behavior over the landscape and reforest burned areas. The trending accumulation of carbon peaks where the current management practices of the LMPs no longer sustain such a large accumulation of growing stock. Carbon storage reaches a peak that may or may not be sustainable. The LMP scenario indicates a general increasing, peaking and slight declining pattern for live biomass carbon inventory.

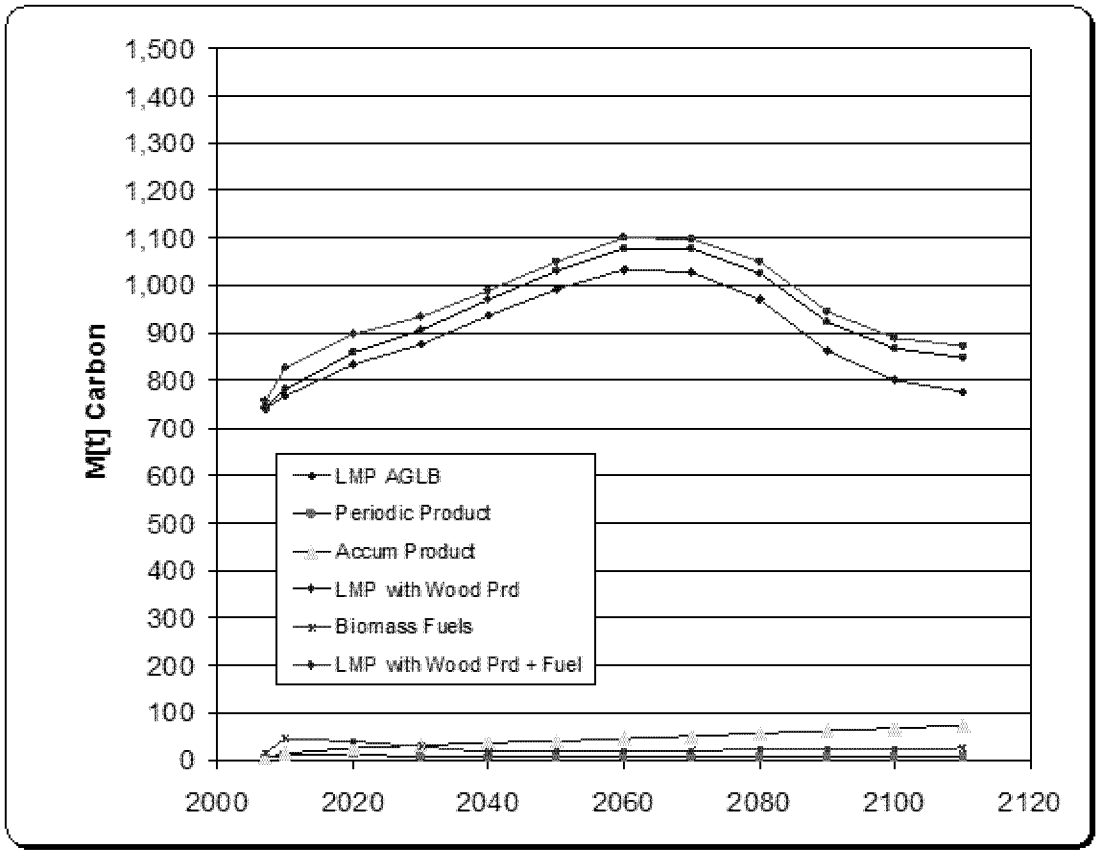


Figure 4 - Carbon Inventory for "Land and Resource Management Plan" Scenario (LMP)

Table 4 -Land Management Plan modeled carbon inventories in 1990, 2020, 2050, and 2110 expressed in MtCo2E

Carbon Pool	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	835	992	775
Above Ground Live Biomass + Harvested Wood Products	n/a	859	1032	848
Above Ground Live Biomass + Harvested Wood Products + Non Merchantable Biomass	n/a	898	1050	873

Discussion

This scenario indicates a general increase, peak and then slight declining pattern for live biomass carbon inventory. Between 1990 and 2020, the above ground live biomass carbon inventory rises from ~595 MtC to ~835 MtC on the 20.1 million acres of NF lands, sequestering slightly over 8 MtC per year. Between 2020 and 2050 the above ground live carbon inventory rises to 992 MtC averaging slightly over 3 MtC per year. Between 2050 and 2110 forests are modeled to become a net carbon emitter, emitting nearly 4 MtC per year.

Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to renewable heat, power and bio-fuels, changes the projections of carbon storage; however, carbon sequestered still follows the same general decreasing trend. Wood products add approximately 100 MtC over the century.

Overall, the LMP scenario modeling indicates that as national forests continue to grow over the next 50-60 years they will be less subject to disturbance than BAU. This is the product of increased integrated vegetation management activities designed and located to reduce losses to disturbance. Modeling indicates that as stands age, growth rates slow, and disturbance continues, forests will begin to emit stored carbon back into the atmosphere.

INTENSIVE EVEN-AGE MANAGEMENT SCENARIO (IEAM)

Management Activities and Costs

The Intensive Even-Age Management Scenario (IEM) is based on implementing an even-aged management scheme on the productive land base within the national forests. Under this scenario all management activities are done to produce wood products and sequester carbon. This alternative is a proxy for intensive forest management under the California Forest Practices Act, and would result in establishment of a regulated forest. Lands that are burned into a deforested condition are reforested. Even-age silvicultural prescriptions are employed when a stand has reached culmination of mean annual increment and is then replanted to a fully stocked condition. All lands that make up the productive forest land base are managed on a 70 year rotation. Acres treated are 1/7 of the productive land base each decade, an average 153,000 acres/year. The management activities implemented under this scenario remove approximately 1.1% of annual growth per year or approximately 11% per decade. See Appendix C for a listing and description of activities that are accomplished under this scenario.

This is a modeling exercise only and does not represent current standards and guidelines, practices, prescriptions and schedules for each forest LMP nor National Forest Management Act or Forest Service Manual direction regarding the use of clear cutting.

Table 5 - IEM Scenario Harvest Volumes and Costs by Decade

Decade	Volume harvested MMBF Average Annual	Acres Integrated Vegetation Management* Average Annual (x 1,000)	Cost of IVM $MM Average Annual
2007-2009	2364	153	195
2010-2019	2373	153	195
2020-2029	2214	153	195
2030-2039	1963	153	195
2040-2049	1742	153	195
2050-2059	1570	153	195
2060-2069	1488	153	195
2070-2079	1518	153	195
2080-2089	1773	153	195
2090-2099	1773	153	195

Decade	Volume harvested MMBF Average Annual	Acres Integrated Vegetation Management* Average Annual (x 1,000)	Cost of IVM $MM Average Annual
2100-2109	1773	153	195
2110-2119	1773	153	195

*Includes reforestation acres

Modeling Assumptions

Modeling assumptions are based on replacing the existing inventory with plantations using maximum biomass rotation and sequestering approximately 37% of the total volume removed into wood products. Modal Site 60 index mixed conifer yield tables were utilized. Data Source: Dunning and Reineke Yield Table for 2nd growth.

Estimated Carbon Sequestered

The IEM scenario would reduce above ground live biomass in the process of establishing a regulated forest. Inventories would eventually level off and remain stable through the end of the century. Without accounting for wood products, live biomass carbon would drop below the 1990 base of 600 MtC at around 2030 and remain below this level through the 100 year projection. Accounting for the carbon stored in products shows a significant increase in carbon storage to approximately 1170 MtC at the end of the century.

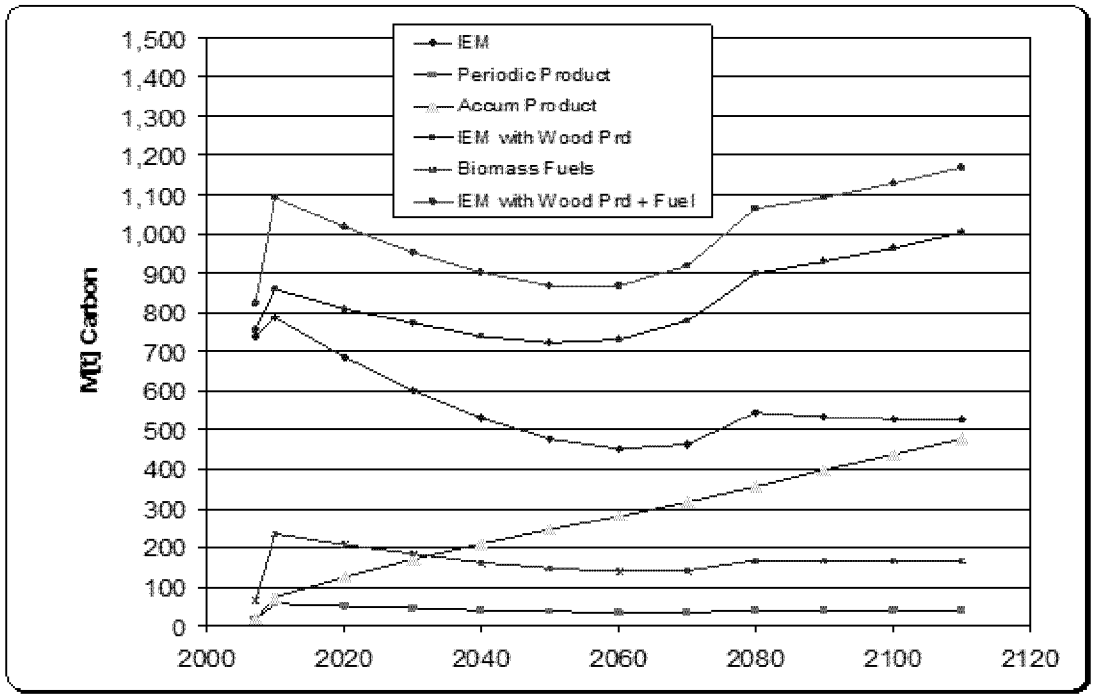


Figure 5 - Carbon Inventory for "Intensive Even-Aged Management" Scenario (IEAM)

Table 6 - Intensive Even Aged Management modeled carbon inventories in 1990 2020, 2050, and 2110 expressed in Million metric tons C02e

Carbon Pools	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	686	475	526
Above Ground Live Biomass + Harvested Wood Products	n/a	810	721	1004
Above Ground Live Biomass + Harvested Wood Products + Non Merchantable Biomass	n/a	1016	867	1170

Discussion

Between 1990 and 2020, the above ground live biomass carbon inventory rises from ~595 MtC to ~686 MtC on the 20.1 million acres of NF lands, sequestering slightly over 3 MtC per year. Between 2020 and 2050, in the process of establishing a regulated forest inventories decrease ~7 MtC per year. Between 2050 and 2110 as harvested areas recover and grow, inventories recover at slightly less than 1MtC per year and remain stable. The process of establishing a regulated forest results in

significant decreases in standing inventory until harvested areas recover and grow. In the long term, regulated forests constitute a stable inventory across the landscape.

Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to renewable heat, power and bio-fuels, significantly changes the projections of carbon storage. The carbon inventory, including all three carbon pools, shows an overall increase of 96% above the 1990 baseline at the end of 2110.

MINIMIZE CANOPY DISTURBANCE SCENARIO (MINCD)

Management Activities and Costs

The Minimize Canopy Disturbance Scenario (MinCD) is based on retaining carbon inventory in trees larger than 20" DBH and retaining high canopy densities. Under this scenario, management activities are performed to reduce surface and ladder fuels and retain the carbon inventory in larger trees. Management activities would be limited to hand or mechanical treatments that remove trees that would be killed by a moderate fire (5' flame length) and to a follow-up prescribed under burn, to reduce ground fuels. Purposeful reductions in existing canopy cover would be minimal. Similar to the IEM Scenario, approximately 1/70 of the productive forest land base (153,000 acres) is treated per year. Lands that are burned into a deforested condition are allowed to recover naturally. Standards and guidelines, practices, prescriptions and schedules for each forest LMPs are not followed.

Management activities under this scenario remove approximately 0.04% of annual growth per year or approximately 0.4% per decade.

See Appendix C for a description of activities.

Table 7 - MinCD Harvest Volumes and Costs by Decade

Decade	Volume Harvested MMBF Average Annual	Acres Integrated Vegetation Management* Average Annual (x 1,000)	Cost of IVM $MM** Average Annual
2007-2009	74	153	195
2010- 2019	79	153	195
2020-2029	90	153	195
2030-2039	101	153	195
2040-2049	108	153	195
2050-2059	110	153	195
2060-2069	107	153	195
2070-2079	100	153	195
2080-2089	90	153	195
2090-2099	84	153	195
2100-2109	80	153	195
2110-2119	79	153	195

*Includes reforestation acres

Modeling Assumptions

The MinCD carbon inventory curve was developed by using the FVS model to apply a light thin from below, allowing no tree over 20-inch dbh to be removed, followed by an under burn to remove surface fuels on our inventory data. Essentially, surface and small ladder fuels are removed. This practice was repeated every 70 years to make this scenario comparable to the IEM scenario, which used an even-aged rotation of 70 years. Over time, tree volume accumulates into larger diameter classes.

Assuming treatment of 1/7 of the landscape every 10 years, fuels treatment activities can have a life expectancy up to about 20 years. Therefore, once the first cycle is completed, approximately 2/7 of the landscape, or 27% is in various stages of a treated condition.

To reflect the gain from reduced mortality by moving a larger proportion of the biomass into larger trees, the modeling Team assumes that the inventory would increase approximately 20% over BAU by 2080 due to reduced fire mortality and increased resilience of the larger trees. This percentage is based upon the Pacific

Southwest Region's Stewardship and Fireshed Assessment (SFA) cadre fire gaming exercises on Forests through the Region.

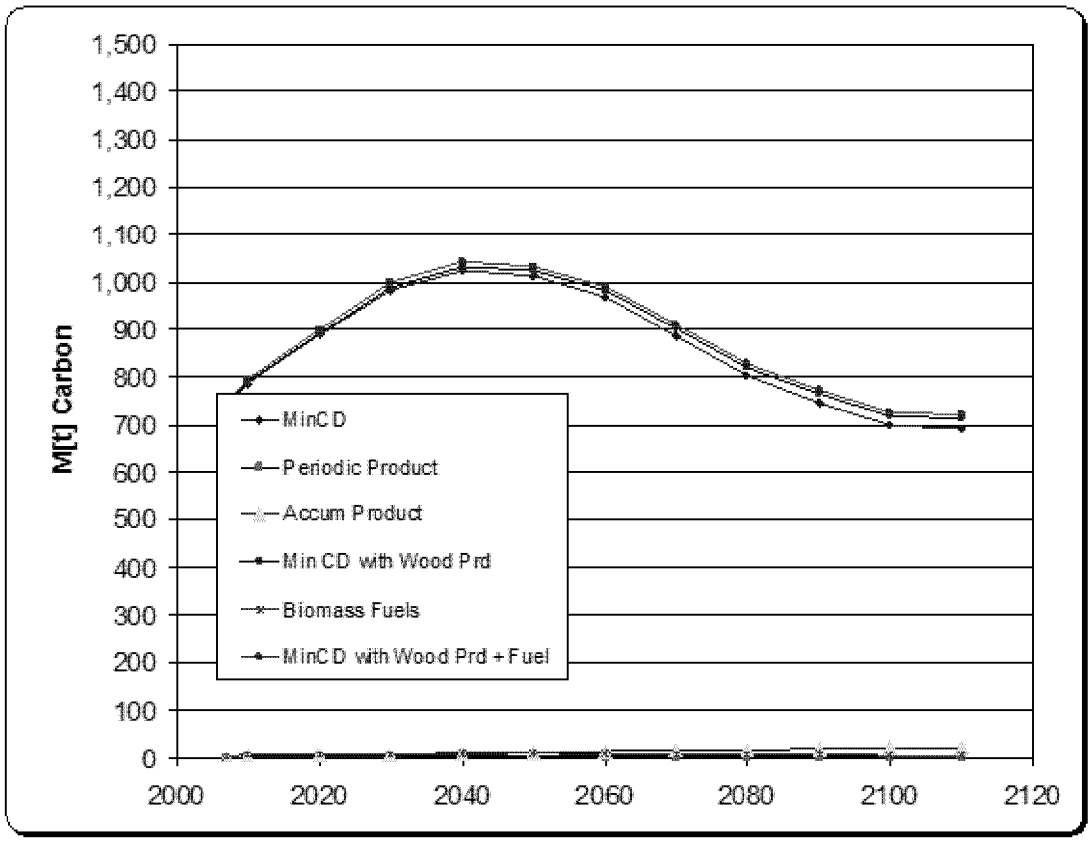


Figure 6 - Carbon Inventory for "Minimize Canopy Disturbance" Scenario (MinCD)

Table 8 - Minimum Canopy Disturbance modeled carbon inventories in 1990 2020, 2050, and 2110 expressed in Million metric tons C02e

Carbon Pools	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	867	1012	693
Above Ground Live Biomass + Harvested Wood Products	n/a	892	1023	714
Above Ground Live Biomass + Harvested Wood Products + Non Merchantable Biomass	n/a	900	1033	720

Estimated Carbon Sequestered

The MinCD curve shows a gradual increase in carbon for the first four decades as management activities focus on the removal of smaller diameter trees and carbon accumulates in larger trees, stands grow at relatively high rates of growth. As treated stands age, growth rates slow down, fires continue to affect the landscape according to Stewardship and Fireshed Assessment Team modeling guidelines, and carbon inventories begin to level off and then begins to decrease.

The MinCD scenario indicates a general increasing, peaking and declining pattern for live biomass carbon inventory. Between 2007 and 2040, the carbon inventory rises from ~740 MtC to ~1020 MtC. From 2040, the carbon inventory steadily declines to 693 MtC in 2110.

Discussion

The MinCD scenario indicates a general increase, peak and then slight declining pattern for live biomass carbon inventory. Between 1990 and 2020, the above ground live biomass carbon inventory rises from ~595 MtC to ~867 MtC on the 20.1 million acres of NF lands, sequestering slightly over 9 MtC per year. Between 2020 and 2050 the above ground live carbon inventory rises to 1,012 MtC averaging slightly over 5 MtC per year. Between 2050 and 2110 forests are modeled to become a net carbon emitter, emitting nearly an average of 5 MtC per year.

Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to renewable heat, power and bio-fuels, only slightly changes the projections of carbon storage; however, carbon sequestered still follows the same general decreasing trend. Wood products add approximately 30 MtC over the century.

MAXIMIZE FOREST RESILIENCY SCENARIO (MAXFR)

Management Activities and Costs

The MaxFR scenario vigorously thins and removes suppressed, intermediate and co-dominant trees up to 30" DBH, retains the most vigorous trees and opens canopies up to 35% cover. These management activities reduce canopy closure to the point that crowns are for he most part not touching. Treated acres are followed by an under burn to remove surface fuels on our inventory data. Lands that are burned into a deforested condition are reforested. Standards and guidelines, practices, prescriptions and schedules for each Forest LMP are not followed. Approximately 5% of the

productive forestland base (536,000 acres) is treated per year, which represents about 2.6% of the 20.2 million acre land base. Management activities under this scenario remove approximately 1.3% of annual growth per year or approximately 13.5% per decade.

See Appendix C for a listing and description of activities and the vigor prescription.

Table 9 - MCD Harvest Volumes and Costs by Decade

Decade	Volume harvested MMBF (x 1,000)	Acres Integrated Vegetation Management* (x 1,000 per yr)	Cost of IVM $MM**
2007-2009	2432	536	682
2010- 2019	2456	536	682
2020-2029	2259	536	273
2030-2039	1652	536	273
2040-2049	1973	536	273
2050-2059	1908	536	273
2060-2069	2318	536	273
2070-2079	2240	536	273
2080-2089	2652	536	273
2090-2099	2423	536	273
2100-2109	2891	536	273
2110-2119	2657	536	273

*Includes reforestation acres

** In 2008 $$ of $1,273/acre for first decade. In subsequent decades treatments will be ¼ mechanical @ $1,273/acre and ¾ acres burning @ $254/acre.

Modeling Assumptions

The MaxFR carbon inventory curve was developed by using the FVS model to apply a thin from below treatment favoring retention of co-dominant and dominant trees, allowing no tree over 30 inch dbh to be removed. Trees are sorted into crown classes, then by crown ratio, then by dbh and starting with suppressed crown classes, the FVS model removes the poorest trees until the 35% canopy cover limit is reached. This practice was repeated every 70 years to make this scenario comparable to the IEM scenario, which uses an even-aged rotation of 70 years. Over time, tree volume accumulates into larger diameter classes.

To reflect the gain from reduced mortality by moving a larger proportion of the biomass into larger trees, the modeling assumes that lands that would be burned into a deforested condition would be reduced significantly and the inventory would increase approximately 20% over BAU by 2080 due to reduced fire mortality and increased resilience of the larger trees. This percentage is consistent with Stewardship and Fireshed Assessment cadre fire gaming exercise on Forests through the Region.

Half of the productive land base is assumed to be treated each decade, an average of 536,000 acres a year. Assuming that fuels treatment activities on forested lands have an effective life of up to about 20 years, retreatment is required. Therefore, once the first cycle is completed, approximately 100% of the "productive" forested landscape is assumed to be in a treated condition. Beginning year 21, treated acres would receive a combination of manual, mechanical and prescribed fire to maintain the areas in a fire resilient condition.

Estimated Carbon Sequestered

The MaxFR scenario indicates a decreasing then gradual increasing and leveling off pattern for live biomass carbon inventory. Between 2007 and 2030, the live biomass carbon inventory decreases from ~740 MtC to ~360 MtC. The carbon live biomass inventory then gradually builds to an average level equaling the 1990 base of ~600MtC.

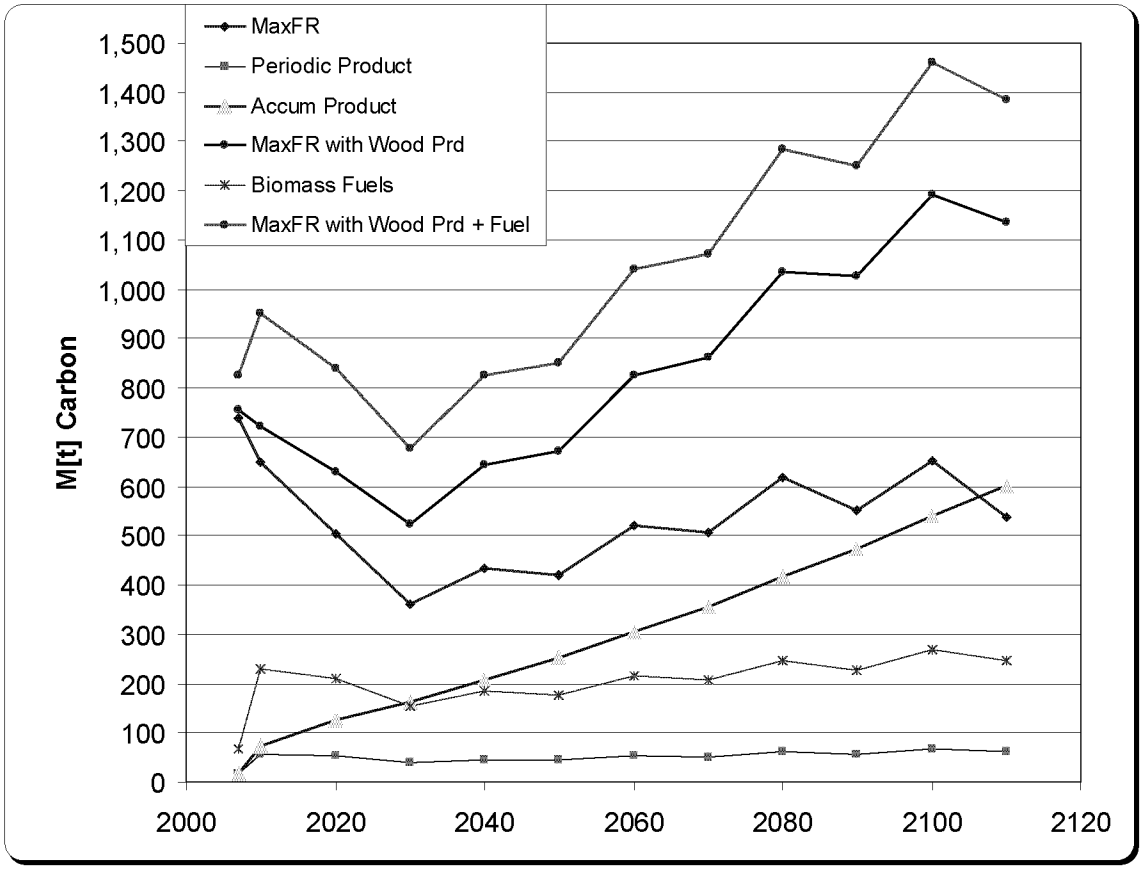


Figure 7 - Carbon Inventory for "Maximize Forest Resiliency" Scenario (MaxFR)

Table 10 - Maximum forest Resilience modeled carbon inventories in 1990, 2020, 2050, and 2110 expressed in Million metric tons C02e

Carbon Pools	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	504	420	538
Above Ground Live Biomass + Harvested Wood Products	n/a	629	672	1136
Above Ground Live Biomass + Harvested Wood Products + Non Merchantable Biomass	n/a	840	849	1383

Discussion

The MaxFR scenario reduces above ground live biomass below 1990 levels throughout the entire modeling period. Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to

renewable heat, power and bio-fuels, significantly changes the projections of carbon storage.

Carbon inventories would increase nearly 3 MtC per year by 2020, continue to drop because of harvest and then increase slightly by 2050 and increase significantly nearly 9 MtC per year by the end of 2110.

REFORESTATION ABOVE BAU SCENARIO (REFOR)

Management Activities and Costs

This REFOR scenario conducts the reforestation of more acres than those analyzed in the BAU Scenario. In addition to the reforestation of an average of 8,600 acres/year, and integrated vegetation management activities on 94,000 acres per year, this scenario conducts reforestation of nearly all areas burned into a deforested condition by wildfires, and reforestation of 50,000 acres of the 136,162 acres of current reforestation need. Similar to BAU, Management activities remove approximately 0.2% of annual growth per year or 2% per decade on productive forest lands until 2090, when additional volume is harvested from reforested plantations.

The reforestation curve shows a trending increase in carbon similar to the BAU curve.

Additional Assumptions

- All practices are accomplished according to plans and prescriptions approved in Forest LMPs. Activities would be bound by standards and guidelines approved in Forest LMPs.
- This reforestation scenario assumes 23% of the total acreage of national forest land burned resulting in a deforested condition on productive forest lands. This assumption was derived from an analysis done by the R5 Regional Silviculturist, analyzing fires in Region 5 greater than 1,000 acres, over a six year period from 2001 to 2007. "Deforested condition" is defined as areas that burn in the highest 3 of 7 mortality classes. Data for this analysis were derived from remote sensing.
- Clearcut salvage harvesting will be implemented on 7.5% of the acres burned (based on an analysis of average clearcut salvage areas on national forest lands between 2003 and 2007).

Modeling Assumptions

Growth and disturbance models used in this scenario are similar to those described for BAU. All management activities that are accomplished under BAU would be

accomplished in this scenario. To determine the number of additional reforestation acres, it is assumed that 50,000 of the current reforestation need acres would be reforested in the first decade, and 85% of the acres modeled to be burned into a deforested condition by wildfire would be reforested throughout the analysis period. Acres reforested above BAU would average 31,600 acres/year over a 100 year period. See Appendix A for a detailed description of how these figures were derived.

Table 11 - BAU Harvest Volumes and Costs by Decade

Decade	Volume harvested MMBF Average Annual BAU+	Volume Harvested MMBF Average Annual BAU	Acres Integrated Vegetation Management* BAU Average Annual (x 1,000)	Acres of reforestation above BAU Average Annual (x 1,000)	Cost of IVM & Reforestation $MM** Average Annual
2007-2009	371	371	93.6	7.1	129
2010- 2019	389	389	93.6	28.5	155
2020-2029	442	442	93.6	35.7	165
2030-2039	479	479	93.6	47.4	179
2040-2049	505	505	93.6	59.1	194
2050-2059	505	505	93.6	59.1	194
2060-2069	480	480	93.6	47.4	179
2070-2079	443	443	93.6	35.7	165
2080-2089	386	386	93.6	24.0	150
2090-2099	380	352	93.6	11.8	134
2100-2109	446	331	93.6	11.8	134
2110-2119	645	328	93.6	11.8	134

*Includes BAU reforestation acres

Estimated Carbon Sequestered

The Reforestation scenario indicates a general and increasing trend, peaking and then declining pattern for live biomass carbon inventory. Between 2007 and 2050, the carbon inventory rises from ~740 MtC to ~1000 MtC on the 20.1 million acres of national forest lands. From 2050, the carbon inventory steadily declines to ~684 0MtC in 2110. The carbon inventory, while steadily increasing 34% to 2050, shows an overall decrease of 10% at the end of 2110.

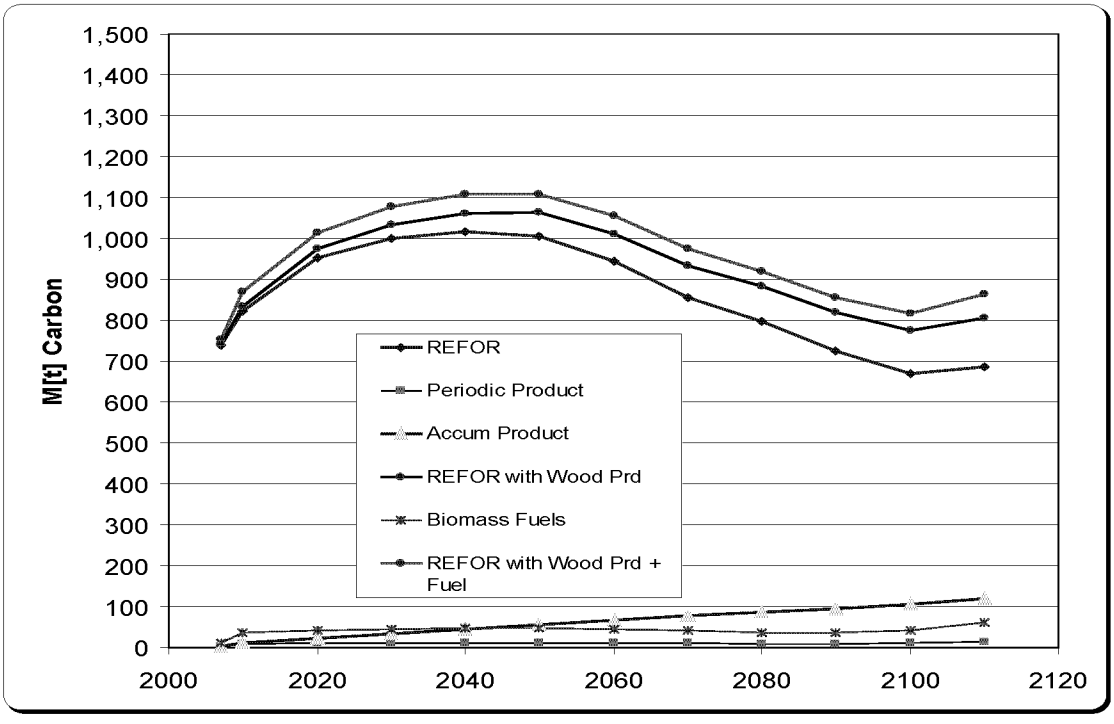


Figure 8 - Carbon Inventory for the "Business as Usual plus Reforestation" Scenario (REFOR)

Table 12 - Reforestation modeled carbon inventories in 1990, 2020, 2050, and 2110 expressed in Million metric tons C02e

Carbon Pool	1990 Baseline	2020	2050	2110
Above Ground Live Biomass	595	951	1006	684
Above Ground Live Biomass + Harvested Wood Products	n/a	973	1062	804
Above Ground Live Biomass + Harvested Wood Products + Non Merchantable Biomass	n/a	1014	1109	864

Discussion

The REFOR scenario indicates a general increase, peak and then slight declining pattern for live biomass carbon inventory. Between 1990 and 2020, the above ground live biomass carbon inventory rises from ~595 MtC to ~951 MtC on the 20.1 million acres of NF lands, sequestering slightly under 12 MtC per year. Between 2020 and 2050 the above ground live carbon inventory rises to 1006 MtC averaging slightly under 3 MtC per year. Between 2050 and 2110 forests are modeled to become a net carbon emitter, emitting slightly over 5 MtC per year.

Including carbon sequestered in forest products and carbon value of non merchantable biomass that could be converted to renewable heat, power and bio-fuels, changes the projections of carbon storage; however, carabon sequestered still follows the same general decreasing trend. Wood products add approximately 180 MtC over the century.

Overall the REFOR scenario modeling indicates some carbon benefits from actively reforesting areas that have been damaged by natural disturbances. The FVS modeling indicates these areas recover above ground live biomass more quickly and provide other benefits in the form of merchantable wood products from subsequent stand management activities.

Economic Analysis of All Scenarios

This economic analysis is based on the value of carbon that is projected to be sequestered over a 100 year period for seven different scenarios. The amount of carbon that is available above a given baseline is assumed to be potentially available. The modeling assumes all carbon storage above baseline levels is designated as Federal Carbon Reserves and all sequestered tons above baseline are fully allocated (rented out) as credits. Carbon payments are assumed to be made in dollars per metric ton of CO2.

Two market rule sets were analyzed, each with two different baseline scenarios. See Table 13 for an explanation of the market rules used for this analysis.

Table 13 - Carbon Market Rule Sets

Factor	Market Rule Set 1	Market Rule Set 2
Duration of Carbon Credit	100 years	10 years
Valuation relative to the Baseline Reference	Amount above or below baseline is analyzed. Can have positive or negative value.	Only carbon above the baseline is available for market each decade. If the carbon available in a scenario is less than the baseline, then zero carbon is available, and the value is zero.
Value per metric ton of carbon	$6	$0.60 (credit is only available for one-tenth the time, 10 years vs. 100 years).
Carbon Pool	Live bole volume of the timber inventory. Timber products sold leave the carbon market system and are no longer available as carbon credits.	Live bole volume of the timber inventory. Timber products sold leave the carbon market system and are no longer available as carbon credits.

Factor	Market Rule Set 1	Market Rule Set 2
Carbon available for market	Assumes the entire inventory above baseline is rented each decade, so only the increment (increase or decrease) above baseline from the previous decade is new carbon (or carbon debt if negative) available for market. Only new carbon from tree growth is available in each decade. Or if the amount of carbon is going down then a carbon debt is produced for that time period.	Only the amount that is greater than the baseline is available for market and given a positive value. If the amount available for a scenario is less than the baseline in any time period, a value of zero is assigned. No negative values or carbon debt is accumulated. The ten year time period allows easier entry and exit from the market, so the market goes to zero if no carbon above baseline is available
Increment valued	Assumes that the change from the previous decade for each scenario, as compared to the change from the baseline, is what is valued. So even if the overall amount of carbon inventory for a scenario is less than the baseline, as long as the incremental change is greater than the incremental change of the baseline, the amount over baseline is given a positive value. So if the scenario is adding carbon faster than the baseline, it is given a value.	Since the carbon credits expire every ten years, there is no accumulated obligation of carbon credits that were purchased in previous time periods. So the amount above baseline for a given scenario in each time period (decade) is available on the carbon market.
Baselines	Two baselines were studied: 1. Business as Usual (BAU) 2. 1990 Reference Point	Two baselines were studied: 1. Business as Usual (BAU) 2. 1990 Reference Point

- This model does not attempt to do the accounting for individual purchases of carbon credit offsets and to track them through time. It just uses all net carbon available each decade and assumes all carbon is purchased as a credit and payments are made.
- All forms of carbon storage have the same value per metric ton. The price per metric ton remains the same regardless of volume purchased. This analysis does not attempt to determine potential differences in market prices from changes in supply and demand for carbon credits over time.
- The economic model assumes that carbon is sequestered in increments of 10 years.
- Discount rates are applied at the midpoint of each decade.

- A constant discount rate of 4% is applied across all scenarios for all ten decades.
- Simple discounting is used. The discount formula of Net Value / (1.04)^n is used. The years to discount, n, is the midpoint of each decade.
- Net Value is the ($/metric ton * Metric Tons Sequestered above baseline) + (Timber Harvest Value as stumpage) - Integrated Vegetative Management Costs.
- This model assumes that all carbon credits do not include any rights to the eventual harvest of the timber. Timber harvest is a separate activity and set of values.
- Value of carbon per metric ton is assumed to be $6 per ton. Values on the Chicago Carbon Exchange have ranged from about $2 to over $6 in the past three years. The current trend is toward the higher level and so was used for this analysis.
- Integrated Vegetation Management (IVM) costs were developed for each scenario. This is an overall average cost to treat acres on national forest lands in Region 5. It includes normal reforestation acres, timber harvest costs, fuel treatments, and costs for planning and NEPA analysis.
- Timber values are an average of the R5 Transaction Evidence Timber Sale database for the past two years for stumpage values.
- Carbon values were added to timber values in each decade for each Scenario to arrive at a total undiscounted value.
- The IVM costs were subtracted from the total value for each decade for each scenario.
- Net Present Value (NPV) was calculated by discounting this net value from the midpoint of each time period using a 4% discount rate. All values are in 2008 base year dollars.
- Analysis was done for each Scenario using Market Rules 1 and 2, with two baselines each, BAU and 1990 Baseline.

ECONOMIC ANALYSIS RESULTS

Each of the market outcomes are summarized here. Details of the analysis may be found in the spreadsheet model developed for this study, on file at the Regional Office.

Market Rule Set 1 With BAU as the Baseline

- (See tab "1-NPV w BAU Base" in the economic modeling spreadsheet)

- All total NPVs for each scenario were negative. These ranged from -$815 million for the Intensive Even-Age Management scenario down to -$13,023 million for the Maximize Forest Resiliency scenario.
- The Intensive Even-Age Management scenario is the only scenario to have positive NPVs, in decade 2, then there is enough growth and harvest to go back above zero in the later decades (decades 7-10).
- Maximize Forest Resiliency has the lowest NPVs, especially in decades 1-5. This scenario has the highest costs, with over three times the costs of the next lower scenario cost.
- The BAU scenario is negative, but has the next highest NPV. This is the baseline in this set, so the carbon values are zero, but timber harvest values are present.

Market Rule Set 1 with 1990 Base as the Baseline

- (See tab "1-NPV w 1990 Base" on economic modeling spreadsheet)
- The 1990 Base provides more carbon available for market as it is a lower baseline to compare to than the BAU scenario. So NPVs are generally greater than those using the BAU baseline.
- Intensive Even-Age Management is the only scenario with an overall positive NPV using this set of rules.
- Maximize Forest Resiliency remains the lowest NPV.

Market Rule Set 2 With BAU as the Baseline

- (See tab "2-NPV w BAU Base" on the economics spreadsheet)
- Intensive Even-Age Management is the only scenario with an overall positive NPV using this set of rules.
- Market Rule Set 2 With 1990 Base as the Baseline
- (see tab "1-NPV w 1990 Base" on economics spreadsheet)
- NPVs are generally higher with these rules. The 1990 Base allows more carbon on the market, and Rule Set 2 does not allow accumulation of negative NPV.
- Scenarios 2, 3, 5 have an overall positive NPV using these rules.
- Three of the scenarios, 2, 3, and 5 have positive NPVs (with an exception in decade 2 for Scenario 3). These rules and scenarios allow an opportunity to conduct a more realistic carbon market as there are some economic incentives for trading.

Table 14 - Total Net Present Value ($Millions)

	Scenario					
Market Rule Set & Baseline	**BAU**	**Land and Resource Management Plan (LMP)**	**Even-Age (IEM)**	**Minimize Canopy Disturbance (MCD)**	**Max Forest Resiliency (MFR)**	**Reforest**
Market Rule Set 1, BAU Baseline	**-1,891**	**-5,736**	**-815**	**-5,209**	**-13,023**	**-3,338**
Market Rule Set 1, 1990 Base	**-553**	**-4,397**	**523**	**-3,870**	**-11,685**	**-2,000**
Market Rule Set 2, BAU Baseline	**-1,891**	**-5,814**	**200**	**-5,298**	**-11,500**	**-3,370**
Market Rule Set 2, 1990 Base	**2,593**	**-1,059**	**1,971**	**-473**	**-10,435**	**1,230**

Summary of Economic Findings

- Maximize Forest Resiliency, has the lowest NPV of all scenarios across all the rule sets and assumptions. It provides negative NPV in all decades and is significantly lower than the other scenarios.
- Intensive Even-Age Management has the highest NPV in all of the Rule Sets except for the Market Rule Set 2-1990 Base set, in which BAU is the highest overall. Examining the NPV chart shows that BAU provides a steadier, higher stream of NPV across decades 1-7, whereas the Even-Age scenarios peaks in decade 2 and then less is available after that as these stands are young and growing back.
- Carbon revenues under Business as Usual (BAU) do not appear to be economically reasonable within a decade and worsens thereafter.
- Market Rule Set 1 with BAU as the baseline most closely resembles the California proposed registry in AB 32. In this set of rules, all of the scenarios provide an overall negative NPV. The Intensive Even-Age Management scenario shows positive NPV during decade 2 and decades 7-10.
- Sensitivity testing of Market Rule Set 1 (with BAU as the baseline) shows that carbon values must increase to over $30 per metric ton in order to stimulate an increase in overall NPV. Most scenarios produce even lower NPV, since this rule

set allows negative NPV or carbon "debt". As a consequence, raising the price only amplifies the negative NPVs for those scenarios and decades when the net carbon sequestration is negative.

Discussion

Although the carbon accounting guidelines used by United Nations and the Kyoto protocols exclude carbon stored in wood products, this analysis suggests that any assessment of the role of forests must consider sequestration of carbon in forest products and a scientifically-based accounting of emissions.

The sustainability of the Region's forest carbon sink in the next 100-years is largely dependent upon the frequency and the extent of disturbance from fire activity, drought, and effectiveness of the fire and forest health management strategies employed.

The BAU trajectory, accumulates carbon in the short-term at a rate greater than it is lost to wildfire, pest, drought, inter-tree competition, etc. This growth is a function of past harvesting and growth.

The analysis indicates that we cannot sustain these present inventory levels with our present practices, budgets and light touch management constraints. Maintenance of inventories and reliable increases will be dependent on our ability to establish healthy, resilient forest ecosystems systems that would be less susceptible to disturbance agents, and would require the Forest Service to modify landscape scale fire behavior which would reduce the size and severity of wildfires. If we are going to develop a number of fast growing plantations which would remove carbon from the air at rates 150% higher than non-intensive management, then they will have to be protected. If we are counting on keeping a large proportion of our carbon in large trees, then these trees need to be protected from severe fire and from pest and drought. We can make these stands more resilient by selecting the most vigorous trees and maintain lower stand density; however, then we run into problems of habitat for many of our key species that desire or need dense and high canopy cover.

While the national forests are seen by many as sinks, it is still unclear how the Region is going to manage forests with frequent fire regimes while increasing carbon storage and reducing carbon emissions from treatments which use fire and wildfires.

Appendix A: Assumptions for BAU, Reforestation Scenarios and Analytical Integrated Vegetation Management Modeling Procedures

METHODS USED TO DEVELOP BAU SCENARIO

The BAU scenario was developed by examining past forest inventories derived from RPA and RSL data and then normalizing them to reflect various utilization standards, different land bases, and tree species. These normalized points reflect general trends of increasing inventory that were the product of growth, changing management trends, harvest and disturbance levels. Inventories reflected that beginning in the early 1990's as a result of significant decreases in harvest levels resulting from Northern Spotted Owl/California Owl management considerations, a sharp increase in volume was occurring. Theoretical modeling of these trends into the future projected an exponential increase in volume. While this could occur for a short period of time, standing inventories were assumed to be reduced by mortality due to increasing size and severity of wildfire, and mortality from insects and disease disturbance.

Using Forest Vegetation Simulator (FVS) (Ritchie, 1999), the Team modeled forest inventory growth over 100 years using the FIA and R5 inventory plots, updating all plots to 2008 in order to normalize all scenarios to a common inventory. The projected inventory growth from FVS was very close to being linear with slight declining growth rates during the last 50 years of the analysis. This projection was very similar to the results of the RPA analysis, using the 1990 inventory reference point. As FVS does not model the effects of catastrophic mortality, such as wildfire, insect and disease outbreaks and drought on growth, this continuing accumulation of volume is most likely inaccurate. Although this type of growth shown with FVS might be able to be sustained over the next 10-20 years, it is not reasonable to postulate that much of California national forest land, under current vegetation management programs and trends, would be able to withstand the intra-forest competitive pressures of high growth rates combined with disturbances such as wildfire, insect and disease. The utility of the FVS model is constrained because it cannot model the effects of stand-replacing wildfire, insect outbreaks, disease epidemics and drought. Therefore, FVS can facilitate reasonable projections of future trends, but is limited in its ability to project out to 100 years.

The Team used SPECTRUM and FELDSPAR (FORPLAN) models as they can incorporate natural disturbance regimes into the modeling process. FIA plots, R5 densified inventory plots, USFS fire history and mortality data were used as inputs to the model.

Projected forest inventory growth from this analysis indicates that most forest vegetative types will reach culmination of growth (growth rate will begin slowing, but the forest will continue to increased inventory until mortality exceeds growth) the next 5-15 years based on the average condition of the Region. This indicates increasing inventory followed by decreasing inventory in light of current management trends and natural disturbance events. This modeling approach appears closer to what may occur on national forest lands, since major natural disturbance events are now the major disturbance agents, as opposed to vegetative treatment activities. The Team also assumed that there is a direct relation between the amount of biomass/fuels being accumulated and the extent and severity of wildfire.

The Team then determined the height of the curve. Other estimates of inventory growth over the next 50 years were analyzed, including the following summarized in Table 1.

Table 1 - Sources consulted to determine likely growth curves for first five decades of model

Sources	% increase over base year	Factors and assumptions included in source data
Conservation Biology Institute database and analysis (CBI)	67%	with Historical data
FVS w/FIA plots	69%	without catastrophic Fire, Pest, Drought
SPECTRUM	48%	with increasing fire
Forest Plans	38%	with disturbance – accelerated
RPA	76%	w/o disturbance

While some of these estimates consider the effects of natural disturbance, none consider the increasing effect of wildfire, insect and disease threat and potential climate change effects. Forest Service forest inventory, fire, and forest growth and yield experts (Warbington, Bahro, and Sherlock 2008 (pers. Comm.)) were consulted in order to establish reasonable assumptions about the effects of increasing natural disturbance. Expert consensus concluded that a 30 to 40% increase in natural disturbance can be expected over the 2007 level in the next 40-50 years.

In summary, the BAU carbon inventory curve is a product of growth models predicting a declining rate of growth due to stands aging, adjusted for expert

estimations of increasing incidence and scale of disturbances from wildfire and insect and disease mortality. Other scenarios' impacts on inventory can be modeled and compared to BAU, and additional carbon sequestration or emissions can be evaluated. Given the errors associated with measuring and sampling the biomass/carbon inventory, attempting to develop models or algorithms with greater precision did not seem productive. The Team used conservative estimates below those defined by RPA and Forest Plans.

Activities used to project the existing trends are summarized from the FACTS database and uses the last 5-year budget and FACTS footprint for making future projections. The FACTS database includes acres of Wildland Fire Use (now called "Appropriate Management Response"), many of which are in designated wilderness areas.

Each LMP identified vegetation management practices necessary to implement the goals within land allocations. All practices are assumed be accomplished according to approved plans and prescriptions. All forest management activities are assumed to be bound by national forest standards and guidelines, budget, etc.

Assumptions Intensive Even-Age Management scenario

A. The land base for the Intensive Even-Age Management scenario is the RPA productive forest lands.
B. Assumes that 1/7 of the productive forest land is clearcut and reforested every 10 years (70-year rotation).
C. Standards and guidelines, practices, prescriptions and schedules for each LRMP would not be followed. NFMA and FSM direction on the use of clear cutting would not be followed.

Assumptions in the Maximize Forest Resiliency scenario

A. The land base for the carbon flux benchmark is the RPA productive forest lands.
B. The activities to optimize the carbon inventory are modeled with the "vigor" set of prescriptions. This prescription reduces canopy cover to 35%, removes trees based on crown position (suppressed first), crown ratio (smallest crown within each crown position) and then dbh (smallest dbh and works its way up). Removes roughly 50% of the trees.
C. Carbon storage with this scenario is focused on the larger trees.
D. Standards and guidelines, practices, prescriptions and schedules for each LMP would not be followed

Assumptions used for the REFOR Scenario

A. The land base used to apply activities for the Reforestation Scenario is the BAU Scenario land base, non-withdrawn productive forest lands.

B. All practices will be accomplished according to plans and prescriptions approved in Forest LMPs. Activities would be bound by standards and guidelines approved in Forest LMPs.

C. Under this reforestation scenario all activities accomplished under the BAU scenario would be accomplished. Additional reforestation, above the acres reforested under BAU, would be accomplished by reforestation of areas burned into a deforested condition by wildfire and by reforestation of acres currently part of Region 5's reforestation need. Reforestation would be done by planting trees or by natural methods.

D. Region 5 currently has a reforestation need of 136,162 acres. Under this scenario approximately 50,000 acres of the reforestation need would be reforested. Many acres of the reforestation need are covered with dead wood and competing vegetation. Reforestation work on these acres would be expensive and contentious because the use of herbicides would be required to ensure success. The 50,000 acres treated under this scenario would focus work on recent fires; approximately 43,700 acres would come from fires that burned in 2007.

E. The number of acres burned into a deforested condition in the future will be based on a projection of total acres burned each year from 2008 through 2050 (projection by Scott Conway, Mark Nechodom et al). This reforestation scenario assumes 23% of the total acreage of national forest land burned results in a deforested condition on productive forest lands. The assumption that 23% of total national forest acres burned will result in a deforested condition was derived from an analysis done by Mike Landram using fires greater than 1,000 acres in Region 5 from 2001 to 2007. Landram's analysis defined "deforested condition" as areas mapped in the 3 highest mortality classes in a 7 class mortality map derived using remote sensing technology. Deforested condition implies a reforestation need. See the website for an explanation of methods used.

F. Clearcut salvage harvesting will occur on 7.5% of the acres burned. (Business As Usual). The 7.5% was developed by querying the FACTS data base and getting the number of acres harvested using Activity Code 4114 (Stand Clearcutting - Salvage Mortality) from years 2003 to 2007. The number of acres harvested using code 4114 was divided by the acres of national forest lands burned to a deforested condition from years 2001-2005. An assumption was made that there is a 2 year lag between the fire and salvage harvesting. An assumption was made that the activity code Stand Clearcutting - Salvage Mortality would only have been used to report harvesting on stands having less than 20% crown cover. The need for

reforestation in the salvaged areas is a result of the wildfire and not the result of the harvesting. Other salvage harvesting would occur in burned areas but that salvage harvesting would not result in a reforestation need.

Reforestation (REFOR) assumes use of the following methods;

1. Traditional Tree Planting - This method is the one most commonly used in the last 30 years. Reforestation would occur by site preparation of the planting site, planting trees approximately 200 to 300 trees/acre, a release for survival treatment would occur within 5 years of planting and a precommercial thinning treatment at age 15. Areas will be surveyed to verify the success of tree planting. This prescription would occur on areas where salvage harvesting has been accomplished and in areas where small trees or young plantations burned and removal of large overstory trees would not be needed.
2. Natural Regeneration - Natural Regeneration would be accomplished in areas having an adequate seed source or root stock of trees capable of sprouting such as hardwood trees. It would occur in areas where salvage harvesting does not occur. Site preparation and release may or may not occur depending on site conditions. Precommercial thinning may or may not occur at age 15. Areas will be surveyed to verify the success of natural reforestation.
3. Wide Spaced Cluster Planting - Wide spaced cluster planting would be accomplished in areas where an adequate seed source does not exist or where natural regeneration is not reliable. It would occur in both salvaged and not salvaged areas. 145 (30 foot cluster spacing, 3 trees/cluster) to 544 (20 foot cluster spacing, 5 trees/cluster) trees/acre would be planted in clusters of 3 to 5 trees per cluster, clusters would be 20 to 30 feet apart. Site preparation and release would occur. Precommercial thinning may or may not be needed. Areas will be surveyed to verify the success of planting.
4. Planting Founder Stands - Founder Stands would be created where seed sources are gone, in areas that are inaccessible or too steep for other methods, where technology is not available to accomplish site preparation or areas where costs of reforestation work is prohibitive. It would occur in areas where salvage harvesting does not occur. Strategically placed small stands (< 10 acres), would be planted to provide a future seed source for a large area that has no seed source. The actual acres planted within the area with no seed source would be minimal. Site preparation and release may or may not occur depending on site conditions. Precommercial thinning may or may not be needed. Areas will be surveyed to verify the success of planting.
5. Natural Recovery - Under this prescription, areas would be allowed to develop without assistance, no deliberate reforestation would be attempted utilizing either

natural regeneration or planting. This method would be used in areas that are inaccessible or too steep for other methods, where technology is not available to accomplish site preparation, areas where costs of reforestation work is prohibitive, or where vegetation conditions such as brush prohibit reforestation. No surveys or monitoring would be done to determine if and when the areas become forested.

Reforestation after fires

In 2005, the Silviculture group at the R5 Regional Office began encouraging utilization of all the methods described above. These practices have not been in place long enough to draw any trends on the number of acres used for each method. Professional judgment is being used to assign percentages of the treatments used for purposes of this scenario.

1. Traditional Tree Planting -This method could be used on the 7.5% of the acres burned into a deforested condition and in burned areas of small trees and young plantations. Some of the acres salvaged would also be planted using wide spaced cluster planting. Traditional tree planting would occur on 5% of the acres burned into a deforested condition.
2. Natural Regeneration - The FACTS data base was queried to get the number of acres of natural regeneration accomplished in Region 5 from 2001 - 2007. The query resulted in very few acres of natural regeneration accomplished in Region 5. No estimate from historic use of the code can be made. This prescription would occur on 25% of the acres burned into a deforested condition.
3. Wide Spaced Cluster Planting - There are no records in the FACTS data base to show how many acres of cluster planting had been accomplished. This prescription would occur on 50% of the acres burned into a deforested condition.
4. Founder Stands - There are no records in the FACTS data base to show how many acres of founder stand planting has been accomplished. This prescription would not be widely used. As described above the actual acres planted under this scenario would be minimal, this prescription would occur on less than 1% of the acres burned into a deforested condition. No acres are planned for this method.
5. Natural Recovery - Activity Code 4453 is a new code, the code has only been available since 2006. There is not sufficient data to develop an estimate using the FACTS data base. This prescription would occur on 15% of the future acres burned to a deforested condition.

Reforestation of Reforestation Needs - The 50,000 acres of reforestation need planned to be treated under the reforestation scenario would be treated by traditional tree planting and wide spaced cluster planting. Some establishment of founder stand

would occur but the acreage would be minimal. No acres for natural recovery or natural regeneration are planned.

Table 2 - Distribution of Reforestation of "Reforestation Needs" areas

Prescription	% of acreage treated by the prescription	Acres of Reforestation Need treated by the prescription
Tree Planting to meet standards	10	5,000
Wide Spaced Cluster Planting	90	45,000

Appendix B: Definitions

Land and Resource Management Plan (LMP) - A plan that provides the framework to guide the ongoing land and resource management operations of a national forest. The goal of the LMP is to provide a management program reflecting a mix of activities for the use and protection of the Forest. To accomplish this, a LMP:

- Establishes the management direction and associated long-range goals and objectives for the Forest;
- Specifies the standards, approximate timing, and vicinity of the practices necessary to implement that direction; and
- Establishes the monitoring and evaluation requirements needed to ensure that the direction is being carried out, and to determine if outputs and effects have been reasonably estimated.

Forest land - Land at least 10 percent stocked by forest trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated. Forest land includes transition zones, such as areas between heavily forested and nonforested lands that are at least 10 percent stocked with forest trees and forest areas adjacent to urban and built-up lands. Also included are pinyon-juniper and chaparral areas in the West and afforested areas. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of trees must have a crown width of at least 120 feet to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet wide.

Reforestation Needs - National Forest Management Act of 1976 established policy that all forested lands in the National Forest System shall be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. It directed the Forest Service to report annually all lands in the National Forest System where objectives of land management plans indicate the need to reforest areas that have been cut-over or otherwise denuded or deforested, and best potential rate of growth. The acres reported by each forest each year are commonly referred as the "Reforestation Need."

Appendix C: Management Activities and Practices

Forest practices modeled in the scenarios include:

- Site Preparation
  - Clearing land to prepare the ground for tree planting or to prepare the ground for natural regeneration. This activity can be accomplished mechanically by piling debris with a tractor, by hand piling the debris, or by using prescribed fire.
- Tree Planting
  - Planting tree seedlings in the ground.
    1. Traditional tree planting - Planting trees on a grid spacing such as 10' X 10'.
    2. Cluster Planting - Planting trees in widely spaced clusters of 3-5 trees.
- Natural Regeneration
  - Reforestation that occurs without planting trees. It occurs where root stock of sprouting trees is present and sprouts. It also occurs where seed from standing trees falls on the ground, germinates and survives. Site preparation may be done to create an environment that favors the germination of seed and survival of seedlings.
- Natural Recovery
  - Acres burned into a deforested condition would be allowed to develop without assistance; no deliberate reforestation would be attempted utilizing either natural regeneration or planting.
- Conifer Release
  - Removing unwanted competing vegetation from around favorable tree seedlings. Release for survival is done within 1- 3 years after planting or seed germination to help the survival of seedlings. Release for growth is done after the seedling has become established. Release can be accomplished mechanically, by hand or with herbicides.
- Pre-commercial Thinning
  - Cutting small (1" DBH - 10") trees around desirable leave trees. Trees are thinned to a target spacing or trees/acre.
- Commercial Thinning

    - Cutting medium to large (10" DBH +) trees around desirable leave trees, the trees are removed and used for wood products. Trees are thinned to a target spacing or trees/acre.
- Salvage Harvesting
    - Cutting and removing dead and dying trees for wood products.
- Regeneration harvesting with reserved trees.
    - A harvest done to remove an existing stand of trees and replace with a new stand. Most of the trees are removed; some reserve trees are left as part of the new stand. Under the North West Forest Plan (NWFP) 15% of the old stand must be retained, this practice is called Green Tree Retention (GTR).
- Regeneration harvesting without reserved trees.
    - A harvest done to remove an existing stand of trees and replace with a new stand. All of the trees are removed, also called a clearcut.
- Group Selection
    - A harvest done to create small openings in a larger stand. Openings 1/2 acre to 5 acres in size are created by removing all the trees in the group.
- Prescribed Burning
    - Burning under a specific set of conditions to achieve objectives identified in a burn plan.
        1. Broadcast burning - burning that cover a majority of the burn unit.
        2. Jackpot burning - burning of fuels in scattered concentrations, not a majority of unit.
        3. Underburn - burns of low intensity covering a majority of the burn unit.
        4. Fuels Benefit - acres burned in an unplanned ignition where the outcome meets the planned objectives for fuel treatment.
        5. Pile Burning - burning of piled material, includes hand and machine piles and decks.
- Wildland Fire Use
    - Letting natural ignition fires burn under specific conditions to achieve resource objectives.
- Fuelbreak Construction and Maintenance

Vegetative treatment to create a treated strip of lower surface, ladder and /or crown fuels in which expected fire behavior would be reduced.

- Fuels Treatments
    - Rearrangement or removal of vegetative material accomplished by one of the following methods

1. Lop And Scatter - rearranging fuel, limbs & tops, brush, to reduce fuel bed depth or speed up decomposition.
2. Mulching - any crushing, mowing, or other treatment that grinds or chews up fuel.
3. Piling - hand piling or machine piling of fuels.
4. Chipping - feeding fuels into a chipper to change the size/shape, includes leaving on site or removal.

- Pruning
  - Cutting the limbs off a tree up to a specified height on the bole.

Table 1 - Management Activities by Scenario

Management Activity	#1 BAU	# 2 LMP	# 3 Even-Aged Mang	#4 Min Canopy Disturb	#5 Resiliency	# 6 BAU + Reforestation
Site preparation	X	X	X		X	X
Tree Planting	X	X	X		X	X
Natural Regeneration	X	X			X	X
Natural Recovery	X			X		X
Conifer Release	X	X	X		X	X
Precommercial Thinning	X	X	X		X	X
Commercial Thinning	X	X			X	X
Salvage Harvesting	X	X	X			X
Regeneration Harvesting With Reserve Trees	X	X	X			X
Regeneration Harvesting Without Reserve Trees			X			
Group Selection	X	X	X			
Prescribed Fire	X	X		X	X	X
Wildland Fire Use	X	X		X	X	X
Fuelbreak	X	X				X
Fuels Treatment	X	X	X	X	X	X
Pruning	X	X			X	X

Appendix D: Economic Analysis Methods and Assumptions

ASSUMPTIONS IN THE ECONOMIC ANALYSIS

- Carbon payments are made each year in dollars per metric ton.
- Assume all carbon tons above baseline levels as allocated as Federal Carbon Reserves and all carbon tons are fully allocated (rented out) as a credit.
- This model does not attempt to do the accounting for individual purchases of carbon credit offsets and to track them through time. It just uses all net carbon available each decade and assumes all carbon is purchased as a credit and payments are made for a ten year period at the midpoint of each decade.
- All forms of carbon storage have the same value per metric ton.
  - The price per ton remains the same regardless of volume purchased.
  - This analysis does not attempt to determine potential differences in market prices from changes in supply and demand for carbon credits over time.
- Time horizon is 100 years.
- Carbon sequestration is modeled in increments of 10 years. Total system carbon sequestration is reported net carbon sequestered over ten decades (100 years).
- Discount rates are applied at the midpoint of each decade.
- A constant discount rate of 4% is applied across all scenarios for all ten decades.
- The discount formula of Net Value / (1.04)^n is used. This assumes a 4% discount rate. The years to discount, n, is the midpoint of each decade.
- Net Value is the ($/ton * Tons Sequestered above baseline)
- This model assumes that carbon credits do not include any rights to the eventual harvest of the timber. Timber harvest is a separate activity and valued separately (not done in this model).
- Value of carbon per metric ton is assumed to be $6 per ton. This value seemed reasonable in that the price for carbon on the voluntary market during 2007-2008 ranged from $4-7/ton depending on the market (e.g., Chicago Climate Exchange, reported trades under the Regional Greenhouse Gas Initiative (RGGI) and other international trade indices).

Appendix E: Management, Monitoring and Verification Requirements for Project Accountability

This appendix documents how Forest Service managers manage, monitor and verify forest growth and condition. If public lands become an integral component of carbon accounting, management, monitoring and verification will be essential to overall accountability. This appendix is intended to help the interested reader to understand the context for public lands management systems for planning, managing and verifying carbon inventories.

There are two levels of reporting forest carbon stocks and biological emissions: carbon inventory reporting and project reporting. Forest Service managers could plan to achieve inventory levels, project inventory changes, implement programs, monitor, and verify and report carbon inventory over time. Projects are reported in the FACTS and TIMIS databases.

DISCUSSION

The authority to report forest carbon inventory is comparable to the basic authority to report silvicultural practices (project reporting) on National Forest System lands is contained in:

1. Organic Administration Act of 1897.
2. Knutson-Vandenberg Act of 1930.
3. Forest and Rangeland Renewable Resources Planning Act of 1974 (88 Stat. 476, as amended; 16 U.S.C. 1601-1610), that states "it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans."
4. National Forest Management Act of 1976 (90 Stat. 2949; 16 U.S.C. 1600 (note)), that states "it is the policy of the Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the

maximum benefits of multiple use sustained yield management in accordance with land management plans."

5. Title 36 Code of Federal Regulations, Part 219-Planning. These regulations guide silvicultural practices by the requirements found in * 219.15, * 219.27(b), and * 219.27(c).
6. Forest Service Manuals and Handbooks.

R5 FOREST PLANS AND INTERACTIONS WITH CARBON SEQUESTRATION

All of the 17 national forests and the Lake Tahoe Basin Management Unit in the Pacific Southwest Region (R5) have approved land management plans (LMPs). These LMPs were developed as required by the Forest and Rangelands Renewable Resources Planning Act of 1974, as amended by the National Forest Management Act of 1976 (NFMA). All of the LMPs in R5 were developed under the guidance of the 1982 Planning Rule. The LMPs in R5 were first established in the late 1980's up through 1995. The four Southern California national forests were revised in 2005 using the 1982 Planning Rule.

A new Planning Rule was released in April, 2008. The Region is currently developing work plans for plan revisions over the next few years. However, no plan revisions have been completed under the 2008 Planning Rule as of the publication of this report.

CARBON SEQUESTRATION

The amount of net carbon that is sequestered on the national forests in R5 is affected by many things. There is variability in both natural and human caused factors that will vary the amount of carbon sequestered in vegetation and the soil. Natural factors include changes in weather patterns, soil types, elevation, slope aspect, insects, disease, wildfires, etc. Human activities include timber harvest, prescribed burning, fire prevention activities, tree planting, silvicultural activities, range management, etc.

Land management plans can affect carbon sequestration through the goals established, the objectives identified for treatments, allocation of lands to various allowable uses and limitations/controls on activities through standards controlling how activities are planned and carried out.

Controls on Vegetation Management:

- Land allocations - wilderness, nonmotorized recreation, backcountry, motorized recreation, timber harvest, riparian zones, wildlife protection emphases, etc.
- Timber suitable lands criterion
- Controls over diameters available for harvest
- Controls on stand density
- Controls on allowable canopy cover
- Fire prevention/control strategies - SPLATS, HFQLG, suppression, etc.
- Controls for wildlife protection - big trees, spacing, distance from nests, etc.
- Controls for water quality - equivalent acres harvested, riparian strategies, MMR's, BMP's
- Range management - rest/rotation, stubble height

PROCEDURES FOR REPORTING CARBON INVENTORY

The three steps to report carbon inventory are:

1. Carbon inventory is derived from forest inventory plots. The National FIA Program collects, analyzes, and reports information on the status and trends of America's forests: how much forest exists, where it exists, who owns it, and how it is changing, as well as how the trees and other forest vegetation are growing and how much has died or has been removed in recent years. The FIA Program combines this information with related data on insects, diseases, and other types of forest damages and stressors to assess the health condition and potential future risks to forests. The program also projects what the forests are likely to be in 10 to 50 years under various scenarios. This information is essential for evaluating whether current forest management practices are sustainable in the long run and whether current policies will allow future generations to enjoy America's forests.
2. The R5 vegetation inventory program fits within a National FIA program. R5 has augmented the National program by installing plots on all vegetation types, not just forests, and by targeting rare types that require additional samples. The design is intended to provide a baseline vegetation inventory from which long-term monitoring of change (growth, mortality, species composition, etc.) can be assessed. These data are used for a wide variety of purposes, including timber resource status, wildlife habitat assessment, wildfire hazard rating, and monitoring of biological diversity and climate change.
    A. Periodic inventories are updated with the latest vegetation map and inventory mortality data. The tree mortality and removal information is collected in the field on FIA plots. Vegetation maps are overlaid with the plot locations to determine the map label associated with the subplots. The Forest Vegetation

Simulator (FVS) is used to grow individual tree data forward to a common year. Previous growth measurements are used to calibrate diameter growth multipliers.

B. Annual inventories are compiled using the latest vegetation map and available inventory data. For annual inventories, 10 percent of the forested FIA plots are measured each year, each plot represents a 6000 acre hexagon area. Intensification plots and non-forest plots are measured in one field season.

C. Inventory data is put into RSL "Core Tables." Core Tables are used to assist in making projections and adjust the land base to the 1990 reference level. The Western Core Tables are developed to report basic information on land, water, vegetation, forests and timberland on the national forest lands of the Pacific Southwest Region. Land class, and forest type, as well as wood volume information, are organized by reserved, administratively withdrawn, special units, and available lands. Timberland availability and suitability under each national forest Plan is also reported. These reports are similar to those used in the Resource Planning Act Assessment, but with more details on forest land allocations. All FIA and RSL plots are grown and adjusted to the year 2007.

3. Once the Carbon inventory is derived from forest inventory plots and GIS-based resource inventories, vegetation simulation models (GAMMA/FVS and SPECTRUM) are then used to look at land management through time (changes in vegetation over time) and outputs (C) are generated. Vegetation prescriptions, management activities, and disturbance events are assigned to specific land types and the resulting effects on forest outputs (C inventory) are derived. All inventory data are projected in to the future (up to 100 years) using these models.

To summarize, forest inventories provide the vegetation data including species, dbh and height. This data is the input in the GAMA/FVS model that grows the trees and the inventory, growth, mortality and removals are tracked over time. The linear programming model SPECTRUM is used to model vegetation change over time while analyzing different alternatives. SPECTRUM is intended to look out into the future and choose options that best satisfy the selected objectives of each scenario. Refer to the Sierra Nevada Forest Plan Amendment FEIS Appendix B-5 for more details on the modeling effort.

PROJECT REPORTING

The six steps to report projects are:

1. Projects that are reported include a set of activities or practices to remove, reduce or prevent CO2 emissions in the atmosphere by conserving and/or increasing on-site forest carbon stocks such as planting and thinning.

2. Annually, the Regional Forester reports integrated vegetation management activities including reforestation accomplishment and program trends, plantation survival, timber stand improvement (TSI) activities, fuels reduction activities and timber harvest including thinning and salvage program accomplishment in the Forest Service Activity Tracking System (FACTS).
3. The FACTS database is the activity tracking system used for all levels of the Forest Service to report projects.
4. All integrated vegetation management activities are recorded in FACTS annually. Activities from surveys, prescriptions preparation, site preparation, harvest, planting, certification including planting certification, certification of natural regeneration, natural recovery, TSI, etc.
5. A parallel reporting process is the Timber Management Information System (TMIS). TMIS is designed to store and retrieve timber-related information. It provides an efficient way to interface with a variety of other planning and operation systems to avoid duplicating information reporting and beginning anew with each new information requirement. Use of the system is mandatory at the service-wide level. It performs the following functions:
   - Provides information to manage the timber program.
   - Stores and manipulates site specific information in numerous ways.
   - Meets data requirements for support analysis systems, such as forest planning models (FORPLAN) or special studies (for example, endangered species habitat, or defaulted timber sales).
   - Meets data requirements for analysis systems, such as multi-year program budgeting and program accounting and management attainment reporting systems.
   - Sorts and retrieves treatment accomplishment data.
   - Aggregates accomplishment data for regional and national summaries.
6. An additional certification is required for plantations. Certification for adequate restocking is performed on a systematic survey and can take place after the third growing season from planting or anytime thereafter that established seedlings meet Regional certification requirements. Adequate restocking consists of:
   - Meeting a minimum number of established commercial conifer trees per acre (TPA) by forest type and site class.
   - At least 50 percent stocked plots.
   - Stocking well distributed over the area.
   - Silviculturists shall certify plantations as stocked, when in their professional judgment there is reasonable assurance that the plantation will persist in the expected future under prescribed management practices. Persistence means

that no additional funds will be needed to replant release for survival, or protect to meet stocking objectives as stated in this section, or as otherwise stated in the prescription for the stand. Accomplishments are reported in the FACTS database.

APPENDIX F: Conceptual Framework for US Forest Service Public Lands Forest Protocols and Principles

PURPOSE OF PROTOCOL

These concepts are brought forward to facilitate discussion among California Climate Action Registry protocol technical team and entities advancing forest carbon accounting protocols on possible approaches to the Forest Service demonstration of carbon benefits accrued through specific projects on national forest lands.

BACKGROUND AND CONTEXT IN CALIFORNIA

The exact role of public forest lands was not explicitly identified in the protocols or the scoping plans estimating California forests capabilities to sequester carbon. The role of public forest lands in AB 32 was a matter of public comment and interest in the ARB Managed process to develop forestry carbon accounting protocols in California.

After receiving public comments, in December 2007, the California Air Resources Board (ARB) formally requested that the California Climate Action Registry (CCAR) convene a forestry technical working group to develop a revised and expanded set of forestry protocols that would broaden participation of the forest sector including some assessment of public lands. The working group is composed of several State agencies, a number of non-government organization (NGOs) representing land trusts and land conservation interests, environmental interests, representatives of California's industrial and non-industrial private landowners, State Parks and the Forest Service. This group's work was submitted through CCAR to ARB in November 2008 for public review, comment and possible adoption. At the close of this analysis, five forest strategies were identified by the California Climate Action Registry (CCAR) to sequester carbon in California's Forests.

- Reforestation-Increase forest stocking by restoration of native tree cover on lands that were previously forested, but have been out of tree cover for a minimum of ten years-Adopted October 2007

- Conservation Forest Management-Maintain higher forest stocking than required under the California Forest Practices Act regulatory requirements- Adopted October 2007
- Conservation- Prevent the conversion of native forests to non forest uses such as commercial development or agricultural use- Adopted October 2007
- Urban Forestry- Plant trees in urban landscapes for carbon sequestration and energy conservation benefits- Adopted September 2008
- Fuel Hazard Reduction- Manipulate forest stands to increase stand health, reduce susceptibility to drought, insects and disease, and to reduce size and intensity of potential wildfire-Slated for Adoption late 2009.

Under AB 32, any reductions or offsets of carbon emissions are required to meet five principle standards- offsets must be:

- **Real**-reflect actual emission reductions/removals
- **Additional**-beyond what otherwise has happened
- **Quantifiable**-reliably measured or estimated
- **Verifiable**-easily monitored and verifiable
- **Permanent**-irreversible or backed up by a guarantee
- **Enforceable**-backed up by contracts, legal requirements and official registration requirements

These standards required entities interested in providing carbon offsets to establish a carbon baseline against which additional carbon could be credited under an accounting framework. California's law governing forest protocol development, SB 812 passed in 2002, also required carbon to be secured under a permanent conservation easement and verified by a third party certifier.

Significant public comment was received by ARB in public review of these strategies. The permanent conservation easement requirement proved viable for a very small segment of forest landowners in California, primarily non profit land trusts who already had forest lands under conservation easements. The permanent conservation easement requirement proved particularly problematic for most forest landowners.

INTENDED SCOPE OF PROTOCOL

These concepts were developed as starting points for determining how Forest Service lands might begin to address the principle standards outlined in the California Climate Action Registry's protocol revision process in California. They are designed as a starting point for further discussion. Examples are drawn from Region 5, however,

the protocol is intended to be applicable to all Regions and under most current (2008) protocol and reporting regimes.

Entity

Proposal:

The entity shall be the designated Region of the U.S. Forest Service, as a division of the US Department of Agriculture.

Discussion:

The USFS Region is the logical entity definition. The proposal will need discussion of what level of reporting will be required of the entity vs. the administrative reporting unit for the purposes of project reporting.

Administrative Reporting Unit

Proposal:

The reporting unit shall be the Region, as defined above under Entity.

Discussion:

The justification for this administrative boundary is primarily based on the authorities of the Regional Forester, and the level of the agency at which budgetary and land use allocation decisions are made. Land designations are made by Congress and implemented by the agency. However, administrative allocations, such as special management areas (e.g., Protected Activity Centers, Riparian Management Zones, etc.), which limit, designate or encumber management activities are determined by the Regional Forester.

The Region is also appropriate because of baseline definition parameters, described below.

Permanence

Proposal:

The Regional Forester must amend the LMP to designate project lands under a land allocation - a Federal Forest Carbon Reserve (FFCR) - that assures continued accrual of carbon benefits.

Discussion:

The key purpose of permanence provisions within any protocol or reporting regime is to ensure that carbon benefits claimed on a particular parcel or by a particular project are protected in perpetuity. The Forest Service considers the requirement for permanence to be minimal to nil on national forest lands. While it is widely recognized that forests are subject to dynamic changes over time, permanence provisions are generally concerned with conversion of land uses from forestry to other uses, such as urban development or agricultural production. Therefore, the CCAR protocols, as currently written, require a Conservation Easement to be established on the property within which the project takes place. Since Conservation Easements are not a legally plausible solution on public lands, an administrative means of ensuring the basic principles of carbon asset protection over an extended period of time must be found.

The Forest Service must demonstrate that FFCRs on national forest lands will be managed in a manner compatible with accrual of carbon benefits. Any given project on national forest lands, if reported as a project intended to sequester carbon, must show that the land designation or allocation of the specified project site will not be converted to uses incompatible with the reported carbon benefits.

Analysis shows that acreage held in public trust by the Forest Service has increased by 0.025% per annum over the last five years. A brief assessment of Region 5's land acquisition program has shown that, while nearly 5000 acres have been brought into the National Forest System over the past five years, only 500 acres have been conveyed out of the System during the same period. Therefore, it is logically arguable that lands designated for the purposes of carbon benefits accrual will be managed for those benefits for the foreseeable future, and are at little risk of conversion to other uses. Should the Regional Forester determine that project lands should be converted to uses other than carbon benefits accrual, the forestry protocol reporting would reflect that conversion as an emission, just as with any other project. If alternative lands with equivalent carbon benefit values can be designated to replace project lands, those substituted lands would be subject to the same evaluation of baseline and additionally that would be applied to any new project (i.e., they would have to grow carbon to replace the losses to conversion).

The administrative justification for this definition of permanence under this protocol can be strengthened by understanding the authorities under which the Regional Forester may change a land use designation permanently:

1. Under the "Educational Land Grant Act," (cite) the Regional Forester may convey up to 80 acres out of National Forest System lands for the purposes of establishing a public school.

2. The Regional Forester may remove lands from the National Forest System in very small increments under the Small Tracts Act, in order to correct minor property line infringements, such as an inaccurate historical survey, or a private building or development with an insignificant infringement of property boundary.
3. The Townsite Act provides that the Regional Forester may dedicate up to 640 acres for "community purposes" such as a landfill, a recycling center or water treatment plant.

In each of these cases, the total acres that may be removed by the Regional Forester are relatively minor when compared to the minimal size of parcel that must be dedicated under a reported project (CCAR requires a minimum of 100 acres).

Baseline

Proposal:

Regional baseline will be established by documentation of management trends beginning at least ten years prior to project registration, and projected within the context of existing LMPs for each national forest within the Region.

Discussion:

Baseline is the "business as usual" trend in land use and management, which would be in effect were there no deliberate actions or investments to create carbon benefits. The USFS baseline should use a ten-year retrospective analysis of the Regional management direction, including an aggregated analysis of the Land and Resource Management Plans (LMPs) from each national forest within the reporting Region.

Since CCAR requires any participating entity to meet the General Reporting Protocol (GRP), the Regional emissions level should be already established prior to any project reporting. At this time, only non-biological emissions reporting is required. However, in order to establish the carbon stocking levels, the Region would need to report total inventory and removals for the last ten years prior to project establishment. This forms the baseline inventory of biological resources (i.e., trees for the most part!).

It is important to recognize that the LMPs do not provide an adequate analysis of baseline. LMPs are written on a periodic basis by each national forest to document the goals and preferred ecological and management outcomes for that forest over the next ten to fifteen years. While many LMPs are out of date (i.e., their official revision is well beyond the customary 10-15 year cycle), they are largely guidance documents and do not reflect actual management practices, including levels of funding available to accomplish preferred goals.

Additionality

Proposal:

1. The USFS defines additionally as "financial additionally" consistent with international standards.
2. Carbon Benefit Projects will be limited to reforestation, made possible through exogenous funding.
3. Bioenergy feedstocks may provide an additional carbon benefit, claimable by a non-Forest Service contractor or operator, as long as the management project meets the criteria established under Integrated Vegetation Management program definitions.

Discussion:

In order to make the case that a given project has actually accrued carbon benefits, the agency must prove that intentional investments were made and actions were taken in order to create carbon benefits that would otherwise not have been created under the business as usual scenario.

Since most preferred management activities are limited by availability of funds, despite completed NEPA analyses and records of decision, it would seem logical that a given project should demonstrate that accomplishment of the project's objectives were due solely to additional funding. The agency may wish to contemplate whether it would limit project designation to sites where extra-curricular funding has been invested.

Leakage

Proposal:

The requirement to quantify leakage is moot. There is no nexus with reforestation and other emission-stimulating activities.

Discussion:

The burden of proof on the agency is to show that no additional emissions, beyond de minimus levels of emissions, have been created as a result of reforestation or IVM project implementation. Concerns about leakage focus on whether the reporting entity has increased emissions outside of the project's boundaries or activities as a direct result of completing the project. The risk of leakage, or manipulation of any crediting system to show benefits while obscuring impacts, is decreased where the ambit of administrative decision making coincides with project establishment and management. For example, if an entity's land base is no larger than its project, the risk of leakage is nearly null.

Verification

Proposal:

Project certification and verification will be conducted in accordance with standard practices for all forestry protocols under any reporting regime. A minimum requirement for certification is a "Certification of Establishment," produced by a USFS certified silviculturist.

Discussion:

All reforestation projects on national forest lands require that planted stands be certified within three to five years by a Forest Service certified silviculturist, and documented in FACTS. This long-standing process under USFS rules is to ensure that the stand has been properly stocked and established commensurate with the site's capabilities.

Integrated Vegetation Management

Stand density management and modification of fuel profiles in order to decrease the size and intensity of wildfire and to increase resistance to stressors, such as drought, insects and fire is done through integrated vegetation management.

Table 2 - Relationship of FS Programs of work to the AB 32 Forestry Protocols

CCAR Protocol and Status	USFS Program and Management Approach
Reforestation/Afforestation	Reforestation after disturbance
Conservation (avoided conversion of forests to other uses; use of conservation easements)	State and Private Forestry programs, such as Legacy and some urban forestry programs
Fuel hazard reduction (CCAR protocol work has not begun in this area)	Hazardous Fuels Reduction to accomplish complementary objectives, such as stand improvement or wildlife habitat improvements
Conservation forest management (CCAR protocol under revision as of September 2008, expected presentation and adoption by Air Resources Board in November 2008)	Several categories of work to accomplish objectives
Urban Forestry (CCAR protocol coordinated by USFS PSW Center for Urban Forestry Research [McPherson]	Urban and Community Forestry cooperative program to protect, maintain and enhance trees within communities. (Cooperative Forestry Assistance Act of 1978, as amended)

STATUS OF CCAR WORKING GROUP PUBLIC LANDS DISCUSSION

Baseline

"For lands owned or controlled by public agencies, the baseline qualitative characterization shall reflect common forest management practice for the agency and agency project area (harvest retention standards, rotations, and other practices that significantly affect carbon stocks) determined by applicable statutes, regulations, policies, plans and budget over the past ten years. The subsequent quantification of the baseline projection shall use a current inventory estimate and project it into the future for the life of the project based on the qualitative characterization. In the event that such statutes, regulations, policies, budgets, and plans have changed to materially affect the project carbon over the past ten years, the policies leading to the most conservative baseline carbon estimates should be used." (August 2008, CCAR Public Lands Working Group Draft Protocols)

The subgroup has adopted the following approach to establish a baseline on public lands. The following analysis is used with the goal of addressing current and past management constraints in order to provide a picture of why carbon stocks exist at the current level:

Apply a qualitative test to the public land project to determine conditions substantiating the baseline which have existed over the past ten years, including the following:

1. Regulatory structure under which land is managed;
2. Public agency mission;
3. Land management plans officially in place for the project area;
4. Other policy documents that control management activities on the land;
5. Physical management practices applied to the land, including silvicultural practices implemented.

Quantify current carbon stocks on the land using the protocol accounting method for each carbon pool to be measured.

Apply a dynamic baseline (as opposed to base point) by the use of acceptable models used to project the existing carbon stocks into the future for the life of the project.

The goal of this approach is to apply the baseline determined by using these criteria to two new CCAR project types: "Public Land Reforestation" and "Public Land Conservation Forest Management". It is the consensus of the subgroup that the CCAR

"Avoided Deforestation" baseline for private lands is equally applicable to public lands.

Discussion

The starting point for this discussion is the existing CCAR Forest Protocol policy on baselines[1], which requires that the proponent of a project determine the amount of forest carbon stocks at the start of the project, and which would have existed and continued to exist in the absence of the project designed to enhance forest carbon storage. Baselines are most often used at the project level, and establish a control point for determining what the Registry considers additional carbon storage that is verifiable and recordable. CCAR has adopted language governing the meaning of "additional" in this context that will be the topic of further discussion by the public lands subgroup and the committee as a whole[2].

The premise of the above recommendation is that the entirety of the social, fiscal and policy constraints placed on the public forest land managers have resulted in the existing forest stand conditions and carbon stocks. Thus without the implementation of a project, carbon stocks would continue to accrue at the existing rate.

At this point the group found that the answers to several questions stood in the way of defining how the base-point would be carried forward to complete a baseline. Some of those questions are:

- What project types (Conservation, Reforestation, Conservation Forest Management, Restoration or others) will be carried out on public lands?
- What baseline is appropriate for each project type (static or dynamic)?
- How would the qualitative assessment of the past 10 years be used to set a future projection of carbon stocks if a dynamic baseline is used?

The group has concurrence that the starting point of a baseline should be the existing carbon stocks with a qualitative description of a previous ten years of operation and constraints. The subgroup needs further guidance on the questions raised here, in order to reach a recommendation on how a baseline would move forward from the base-point and how this would apply to a variety of project types

---

[1] The protocol wording is as follows: "Setting GHG accounting baselines for projects is a subjective process, as these baselines are counterfactual scenarios (i.e. what would have happened in the absence of the project). As a result, it should be noted that other programs may have approaches to forest project baselines that differ from those described in this section…"

[2] The existing CCAR forest protocols define additionality as "Forest project practices that exceed the baseline characterization, including any applicable mandatory land use laws and regulations".

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2. USDA Forest Service, 2007. Mapping Risk from Forest Insects and Diseases.

3. Westerling AL, Hidalgo HG, Craver DR, Swetnam TW, 2006. Warming and earlier spring increase Western US forest wildlfire activity. Science 313:940-943.

4. Miller JD, Safford HD, Crimmins M, Thode AE, 2008. Quantitative evidence for increasing forest fire severity in the Sierra Nevada and southern Cascade Mountains, California and Nevada, USA. Draft submitted to Ecosystems.

5. USDA Forest Service, Pacific Southwest Region Reforestation Trends, 2008. [WWW document]. URL http://www.fs.fed.us/r5/rsl/projects/postfirecondition/info/Reforestation.shtml.

6. Ritchie, MW. 1999. A compendium of growth and yield simulators for the Pacific States. General Technical Report PSW-GTR-174. Albany CA: Pacific Southwest Research Station, USDA Forest Service. 59 pp.

7. USDA Forest Service, 2004. Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement. Pacific Southwest Region.



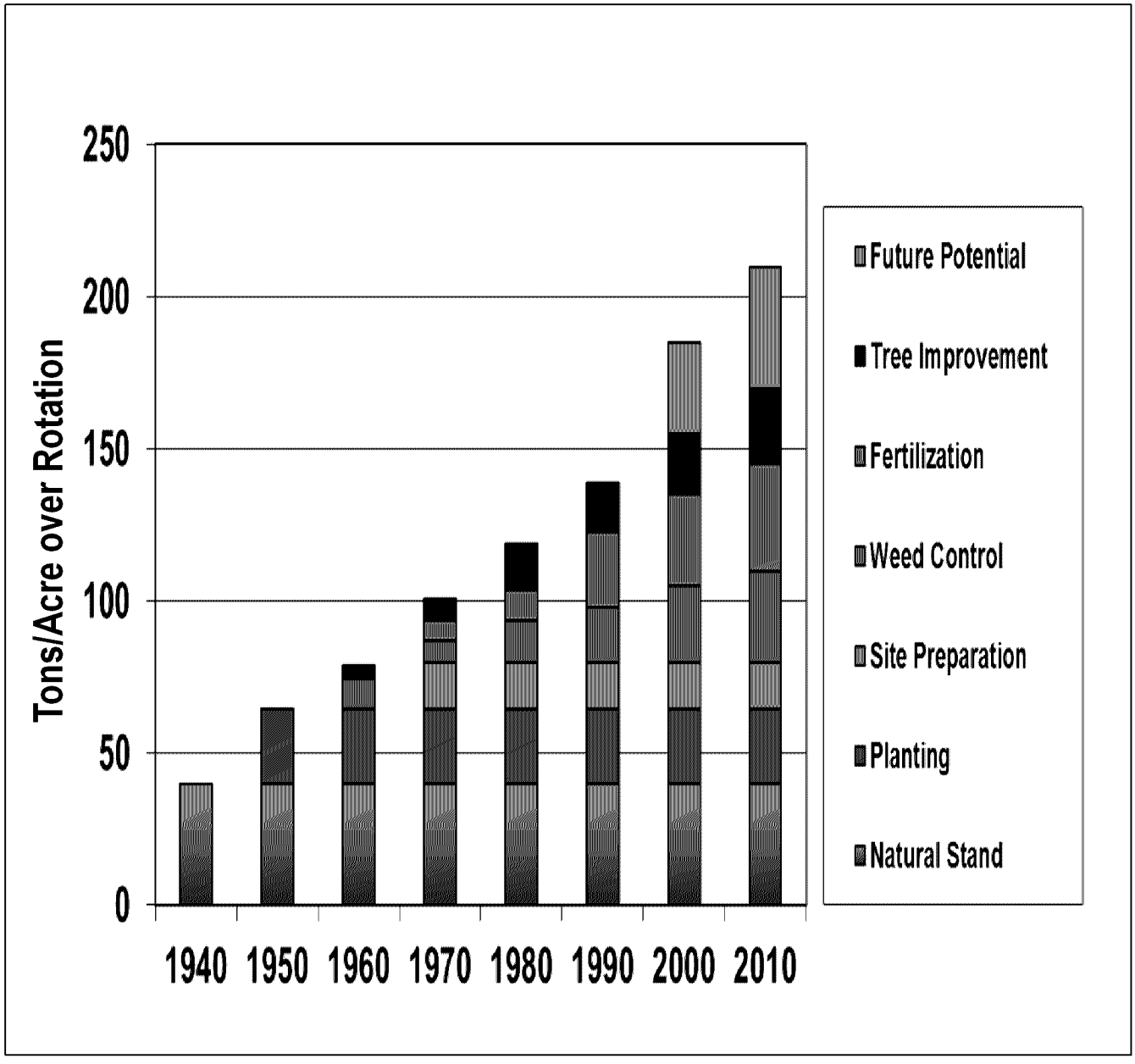

PlumCreek

Growing Value from Exceptional Resources

Aspects of Forest Thinning in a Carbon Context

June 26, 2013

Dramatic Gains in Southern Pine Forest Productivity



Redrawn from: Fox, T.R., E.J. Jokela and H.L. Allen. 2007. The development of pine plantation silviculture in the southern United States. J. Forestry 105:337-347.

Forest Thinnings – the Premise:

Wood sourced from forest thinnings represent a de minimus impact on carbon balances across a forested landscape –

Think about stands as parts of the landscape!

Two examples:

1. Southern Pine Plantation Management – loblolly pine dominant on southern landscape
2. Unevened Aged Hardwood Management – Northern Hardwood example

Forests dynamically change over time.

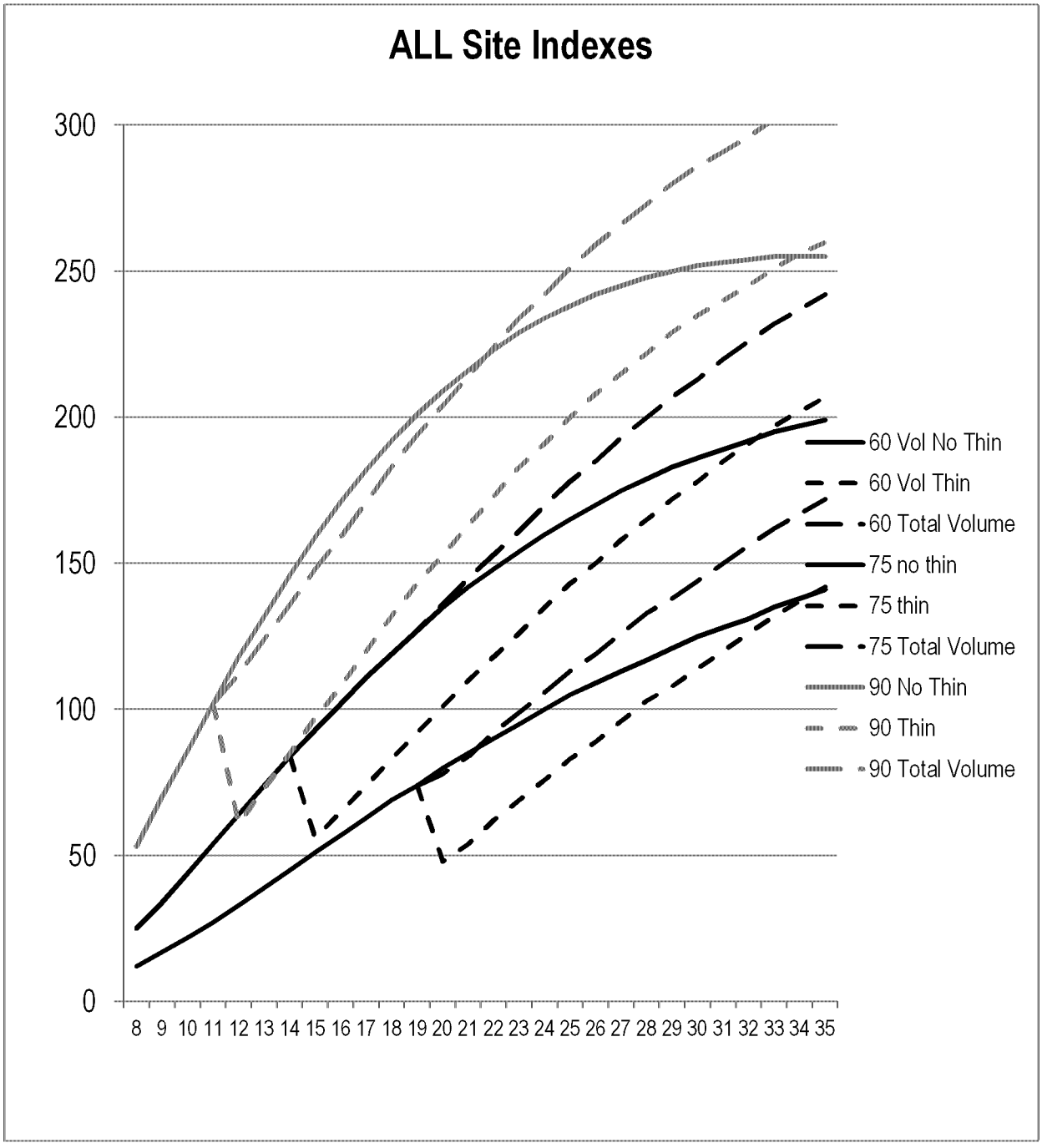
Southern Loblolly Pine Plantation Assumptions

- Artificially regenerated with improved seedlings
- Some level of competition control
- Stands are managed in rotations generally from low-20s in age to mid-30s
- Stands are thinned either once or twice in rotation
- Scenarios run include site index 60, 75, and 90
- Thinnings are a carbon by-product on path to final harvest

Southern Loblolly Pine Thinning Scenarios – Other Points

- Thinning is currently a significant and existing part of the southern pine landscape – NE Louisiana example
- Not thinning planted pine stands is an unrealistic option with long-term negative carbon implications across landscape:
  - Creates high risk of insect/disease/fire due to poor stand health conditions
  - Creates pressure to shorten rotations - economics
- Scenarios occur on all types of planted pine ownership classes (large, small non-industrial private, etc.)
- Remember the basic economics

Comparison of No Thin, Thin and Total Volume Produced for Loblolly Pine Site Indexes 60, 75, and 90



Thinnings for Uneven-aged Management Situation

- Example – Northern Hardwoods
- By definition, stand entries would occur every 12-18 years and objective is to maintain long term consistent stand volumes
- Again, this is an ongoing, current management regime

Requirements / Concerns

- Defining thinning regimes –
  - Basal Area (BA) is simple, measureable consistent forestry standard
  - Use to prevent misuse
- Tracking information to the mill, biomass facility
- Tracking requirements depend on feedstock assessment / treatment
- Remember, residuals are recognized as “carbon neutral” source so tracking not needed

An Example Comparison of Southern Pine Management Regimes with and without Thinning with respect to Wood Inventory and Harvest

National Council for Air and Stream Improvement

Summary

A simulated forest consisting of 100 one-acre plantations was used to evaluate the impact of placing a constraint on thinning. The planning horizon was 50 years and the management options considered were,

CC: Clearcut a stand twice during the 50 year planning horizon, or

CTC: Clearcut and plant, then thin before the second clearcut. There is at least 15 years between a thin and a clearcut.

Habplan was used to solve for a harvest schedule where the objective was to maximize the total dry weight of harvested wood. Pulpwood, chip-n-saw and sawlog dry-weight removals were tracked. Harvest scheduling results were compared with and without regime CTC being allowed. Initial stand conditions were input to the PMRC growth and yield model to simulate the output that would occur for each stand under each of the possible thinning and clearcut regimes. The conclusion was that there was a small gain in potential removals if thinning was allowed. This is not surprising, because constraints almost always reduce potential yields (Van Deusen et al. 2010, 2012). However, the residual dry weight in the forest converges to nearly the same result at the end of the planning period.

Introduction

The effect of thinning on pine plantations is difficult to quantify, because it involves long-term remeasurements and many variables that impact the results. Bailey and Ware (1983) list the most important variables to consider when modeling thinning:

1. proportion of trees removed.
2. proportion of basal area removed.
3. age of the stand when thinned.
4. elapsed time since thinning.
5. the diameter ratios D_1/D_b and D_a/D_b,

where D_1, D_a and D_b are quadratic mean diameters of trees: removed in thinning, after thinning and before thinning. Thinnings can be described in numerous ways. For example, there are thinnings from below, from above, diameter limit, and row thinnings. The growth of residual trees will be impacted by increased availability of nutrients and sunlight (Oliver and Larson 1990), and trees that would have died are removed. Thinning allows for the possibility of obtaining additional fiber from a stand and redistributing the growth onto different trees, even though final stand volume may remain the same.

Amateis et al. (1996) reported the observed yields of thinned and unthinned stands of loblolly pine at 121 locations in the southeastern United States. At each location, three plots, matched on site index, initial basal area and trees per acre, were established. Each matched plot was subjected to one of the following treatments: no thinning, removal of one-third of the basal area, and removal of one-half of the basal area. Their data indicated that thinning had a slight negative effect on volume after 12 years. However, modeling suggested that over a longer time frame accelerated growth of the thinned stand could produce a higher yield than in an unthinned stand.

The Amateis et al. (1996) result is supported by Oliver and Larson (1990) who found that stand volume after thinning can exceed the unthinned stand volume, given enough time. For repeatedly thinned stands, (Bailey and Ware 1983) also projected slight gains for loblolly and slash pine relative to unthinned stands. However, long term thinning results are often based on projections, because data on multiple thinnings in southern pine plantations are rare.

Methods

We used harvest scheduling software (Habplan) (Van Deusen 1999, 2001) to compare potential revenue from managing plantations with a combination of thinning and clearcutting versus only clearcutting. We used a 50 year planning horizon with relatively limited management options that allowed for application of two clearcuts with planting to achieve 500 trees per acre at age 5 using herbicide and bedding. Thinning after the first clearcut, but at least 15 years before the second clearcut, is allowed in the thinning scenario

Initial stand conditions

We used the growth and yield equations (Harrison and Borders 1996) developed by the University of Georgia Plantation Management Research Coop (PMRC) to grow, thin and clearcut a simulated set of 100 plantation stands.

Each stand had a site index of 75 with 500 trees per acre, basal area of 27.4 ft^2, and dominate height of 22.4 feet at age 5. This basic stand was projected so that ages ranged from 5 to 29, and there were 4 stands at each age in the initial forest. This resulted in a 100 stand forest where each stand had the same characteristics when it was at age 5. Following a clearcut, the stands were planted to also achieve 500 trees per acre at age 5, but herbicide and bedding boosted their growth significantly relative to the original stands. This resulted in increasing residual biomass over the first half of the planning horizon.

This example application is different from one based on an actual forest only because we generated the initial stand conditions. The fact that all stands are identical at age 5

eliminates a source of variability from the comparison of management with and without thinning. Otherwise, the simulation will proceed exactly as it would for an actual forest. All forest management planning exercises are based on predicting how stands respond to management treatment regimes.

Management regimes

Management regimes are defined for each stand by years when actions and/or outputs occur. This process is facilitated by considering regime classes where all regimes within a class share the same actions, but the actions occur in different years. For example, within the class of regimes consisting of two clearcuts, one regime calls for clearcuts in years 5 and 33 and another calls for clearcuts in years 6 and 33.

- DN - Do nothing to the stand over the 50 year plan.
- CC - Clearcut once during the first 25 years, replant to achieve 500 TPA at age 5 using herbicide and bedding, then clearcut again during the second 25 years.
- CTC - Clearcut and replant as with the CC regimes. However, one thinning is also done at least 15 years before the second clearcut. All thinnings are down to 60% of the pre-thin basal area.

All regimes (CC and CTC) were simulated with the PMRC model (Harrison and Borders 1996). We assumed that each stand was 1-acre in size. There were no adjacency (green-up) restrictions, so spatial configuration was not considered.

Product assumptions

Three tree DBH size classes were considered: pulpwood (4" - 9"), chip-saw (9" - 13"), and sawlog (13+"). We did not make economic assumptions about the relative value of these classes. Rather, the harvest schedules were judged by the total dry weight that was harvested over the 50 year planning horizon. The dry weight removed in each size class over the 50 years is shown along with the residual dry weight left in the forest.

We used Habplan to select one of the valid regimes for each stand in such a way that dry weight removed from the forest over the 50 year plan was large while meeting even flow constraints. The regime classes described above resulted in 325 unique CC regimes and 1540 unique TCT regimes that could be applied to each stand. Each stand could also be assigned a do-nothing regime. With 1+325+1540 regimes being considered for each of 100 stands, there are 1866^{100} possible schedules where thinning and clearcutting are allowed. We considered any schedule that met the even-flow constraints as feasible. It is not surprising that yield under many schedules approximated yield of the optimal schedule, and Habplan can produce an array of near-optimal schedules.

Results and discussion

The results where the harvest schedule is based on total dry weight removed show similar trends with or without thinning. The max dry weight schedule is achieved by assigning the regime that produces the most dry weight harvest for each stand regardless of even flow. The max thinning schedule could achieve a total of 28,667 tons and the max no-thin schedule

could achieve 26,200 tons. When mild even flow constraints are added, the thinning schedule produces 24,100 tons and the no-thin schedule produces 22,532 tons. Therefore, thinning results in about a 7% increase in potential yield over 50 years for this example.

The product dry weight removals and the residual (Fig 1) show the thin and no-thin schedules. The residual dry weight trends begin and end at roughly the same levels for both scenarios. The year 1 residual shows what would be in the forest at the end of the first year. The thinning residual deviates from the clearcut only schedule during some intermediate years. The residual dry weight increases over the first half of the planning horizon, because the original stands are replaced with faster growing plantations.

The ending age class distribution is younger by a few years than the initial age class distribution, but the standing biomass is greater due to the faster growing plantations. Pulpwood harvest is greatest at the beginning of the planning period, and sawlog harvest is greatest at the end. The thinning options allow for somewhat more sawlog harvest.

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prepared loblolly pine plantations in the Carolinas, Georgia, Alabama and Florida. Gen. Tech Rep. University of Georgia 1996-1. 64 p.

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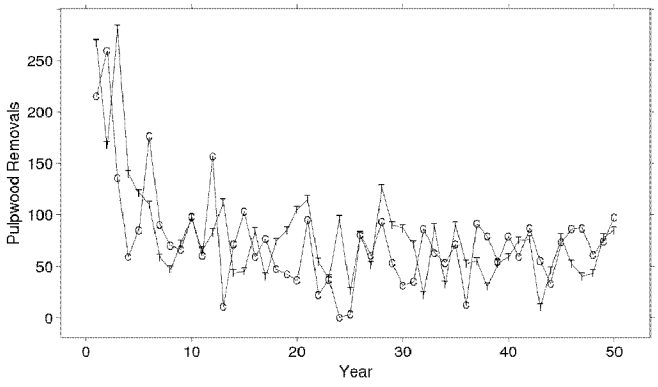
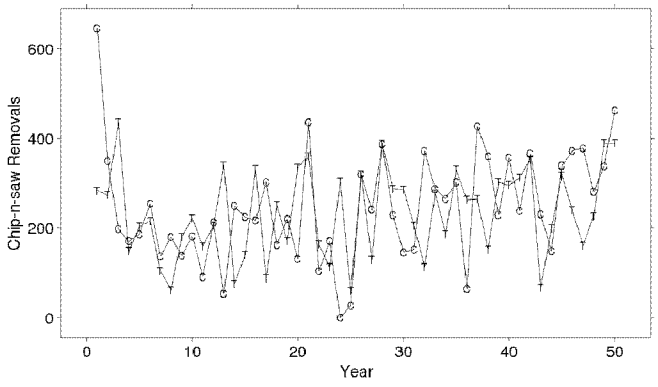
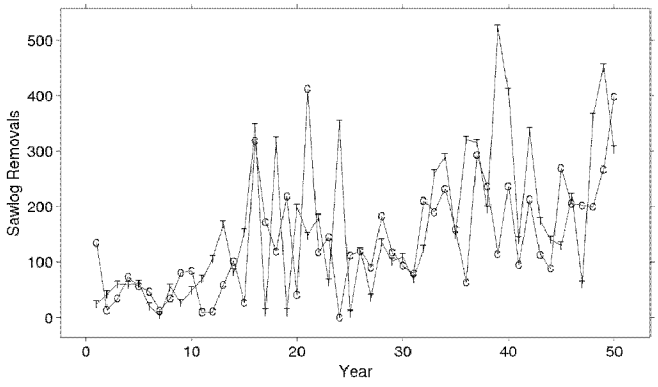
Van Deusen, P.C., T.B. Wigley, and A.A. Lucier, A.A. 2012.Cumulative effects of constraints on forest management. *Journal of Forestry* 110(3): 389-395.



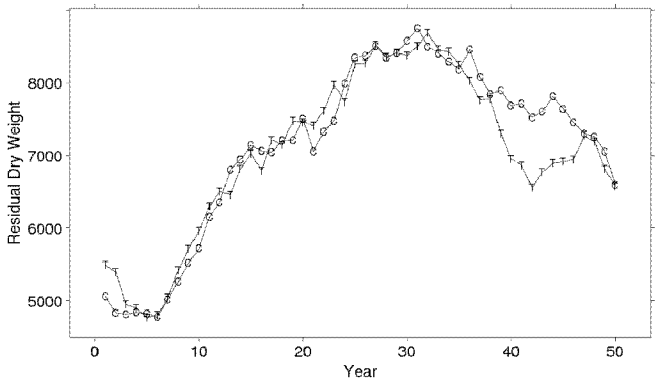
(a) Pulpwood Dry Weight



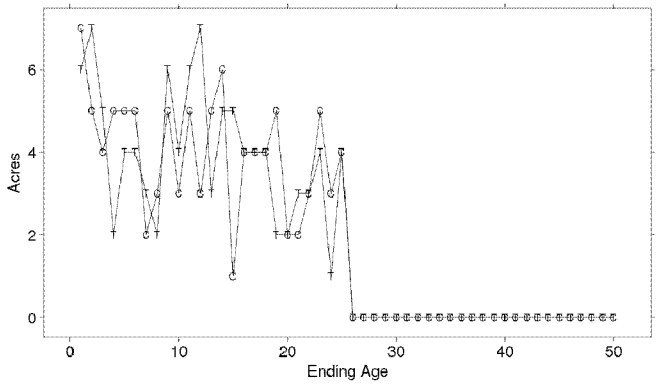
(b) Chip-n-saw Dry Weight



(c) Sawlog Dry Weight



(d) Residual Dry Weight



(e) Ending Age Class

Figure 1: Dry weight removals (tons) of pulpwood, chip-n-saw and sawlogs for the best clearcut (C) only and thinning with clearcut (T) harvest schedules. The residual dry weight graph shows what was in the forest at the end of each year. The ending age class graph shows acres by age class at the end of the planning horizon.

From:	Epanchin, Pete
To:	Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent:	6/11/2013 12:38:59 PM
Subject:	Part 1 with a new conceptual diagram for AF2 (figure 3)
Attachments:	AF2 main body_5 17 2013_clean with comments_BI.aaf_PEpartI.docx; slides for conceptual model.v2.pptx

Howdy,
After our meeting today, Sara & I talked about the conceptual diagram for Part 1.
I made some changes to it (improved it!) by adding in more complexity, but still keeping it simple.
Here it is, both as a new figure in the main body and as a ppt. The ppt has both the old version and the new one. Easy to edit in ppt.
Feedback always welcome.
Pete

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202-343-9598

From: Epanchin, Pete
To: Epanchin, Pete; Jenkins, Jennifer; Ohrel, Sara; Sherry, Christopher
Sent: 6/6/2013 5:42:02 PM
Subject: RE: Part 1 and Appendix O
Attachments: AF2 main body_5 17 2013_clean with comments_BI.aaf_PEpartI.docx

Sorry to do this, but I was rereading Part I and I made a few minor changes. Please use this latest version. Sorry!

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
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202-343-9598

From: Epanchin, Pete
Sent: Thursday, June 06, 2013 5:25 PM
To: Jenkins, Jennifer; Ohrel, Sara; Sherry, Christopher
Subject: Part 1 and Appendix O

Hi Team Biomass,

Attached are my revisions to Part 1. Please take a look and comment/edit away. (I also looked at the previous version, with the "lost" comments—nothing new there).

Thanks,

Pete

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Baker, Justin
To: Ohrel, Sara
Sent: 6/4/2013 12:01:16 PM
Subject: FABA APPENDIX H_6_3_2013.docx
Attachments: FABA APPENDIX H_6_3_2013.docx

From: Jenkins, Jennifer
To: Epanchin, Pete; Sherry, Christopher; Ohrel, Sara
Sent: 5/16/2013 11:25:37 PM
Subject: RE: intermediate version
Attachments: AF2 main body_5.17.2013_pe jcj.docx; TO 003_REVISED_Appendix B_04-12-2013 jcj 5.17.2013.docx

OK, all --

Here we are. I have edited some pieces of Section 1, and then temporal scale, spatial scale, and feedstocks in Part 2. I think everything else is up to date here, Sara, so all you need to do is insert your updated baseline section and we are good to go.

Thanks for sending to Bill!

Have a great weekend and a lovely week, everyone. I will be available (but not too available!) next week in case I can be useful at all during the editing/ revising process for the next stage.

FYI, Mark Flugge is out next week also, on work-related travel. We can ask ICF to reformat for Paul if need be, but Mark said they would need something like 24 hours to turn it around, depending on how much there was for ICF to do. I'm thinking not much, but that's an option if it's too ugly for EPA to clean up next week.

all the best

Go Team!

Jen

PS I am also attaching an updated version of Appendix B that contains the text I axed from the main body. Pete, since you will be in the office tomorrow would you save this to g:\ for posterity? thanks!

From: Epanchin, Pete
Sent: Thursday, May 16, 2013 9:48 PM
To: Jenkins, Jennifer; Sherry, Christopher; Ohrel, Sara
Subject: RE: intermediate version

Yes, Here you are, Jen!
Here are my edits to part 3. Not very substantial edits, but edits all the same.

Team, as Jen said, **Ex. 5 - Deliberative** There are some blank cells for FABA & terms--Sara if you have time you should try to populate those cells.

Pete Epanchin, Ph.D.
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From: Jenkins, Jennifer
Sent: Thursday, May 16, 2013 7:01 PM
To: Epanchin, Pete; Sherry, Christopher; Ohrel, Sara
Subject: intermediate version

Hi folks –

I have to leave now [Ex. 6 - Personal Privacy] and am halfway through the spatial scale section but will pick this back up again, I hope, at 9:00 or 9:30. Wanted to send it now for you Pete, in case you can add your edit now (before 9:00 when I want it back!). Next up is feedstocks and then it's back to Sara for baselines.

I noted that we did not have [Ex. 5 - Deliberative] version so I added it in. I put it at the end of that feedstock-level discussion – we'll need to add some clarifying text aside from the caption but that should be fine.

This will not be finished when it goes to you tonight, Sara – it is messy! I don't think you need to spend lots of time cleaning it up for Bill though – I would suggest that you just drop in the baselines piece, accept the changes, and call it a day. We will definitely want to have the clean version for Bill (including comments) to get rid of those tracked changes. I am also trying to flag the places where I saw Suzie and Bill seemed to conflict, in comments.

Till later
Jen

From: Epanchin, Pete
Sent: Thursday, May 16, 2013 5:15 PM
To: Jenkins, Jennifer; Sherry, Christopher; Ohrel, Sara
Subject: RE: Section 5

Troop:
Slight change, I will very briefly take the pen tonight after Jen sends her version out. I have a few edits I'd like to make

[Ex. 5 - Deliberative]

Sound ok?
After I do those edits, I will send it back out tonight.
Cheers,
Pete

Pete Epanchin, Ph.D.
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From: Jenkins, Jennifer
Sent: Thursday, May 16, 2013 5:03 PM
To: Sherry, Christopher; Ohrel, Sara; Epanchin, Pete
Subject: RE: Section 5

Thanks!

An update:

Bill is ready to receive the next draft tomorrow from Sara. I am editing now, and will send what I have to the group tonight, either from my cube or from home depending on when I can get it done. I'll insert the ES and this Part 5 and Chris' finished L term piece. Should I use the clean or the tracked version of Part 4?

Sara will insert the baseline text tomorrow, and also review Part 2 for anything major. Then it'll go to Bill and we can all relax!

Jen

From: Sherry, Christopher
Sent: Thursday, May 16, 2013 4:59 PM
To: Jenkins, Jennifer; Ohrel, Sara; Epanchin, Pete
Subject: Section 5

Here's a draft of text for insertion as a placeholder for Section 5. Feel free to edit and add and subtract items.

Chris

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From:	Epanchin, Pete
To:	Sherry, Christopher; Jenkins, Jennifer; Ohrel, Sara
Sent:	5/16/2013 2:11:14 PM
Subject:	RE: AF2 main body
Attachments:	AF2 main body_5 8 2013_sk5-9_CS_pe_2-CS_5.16.2013_pe.docx; Section 4 (Clean)_5.14.13_pe.docx

Hi All,
Part 4 looks good, Chris. I made a few minor edits. I am attaching it along with this version inserted into the main body, both in track changes.
-Pete

Pete Epanchin, Ph.D.
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202-343-9598

From: Sherry, Christopher
Sent: Thursday, May 16, 2013 1:33 PM
To: Jenkins, Jennifer; Ohrel, Sara; Epanchin, Pete
Subject: AF2 main body

Team,

Attached is the body of the document, with my edits and comments on Sections 3 and 4. I will follow up with a brief description of the purpose of Section 5 and list of possible discussion topics.

I've also attached a clean version of Section 4 – given the number of edits on this section by multiple folks. (Note, I had to make some formatting fixes to this when I accepted all changes, so it may be easiest to simply replace with this text in Section 4 of the next iteration – unless you all have additional edits.)

Chris

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From:	Ohrel, Sara
To:	Justin Baker
Sent:	5/14/2013 10:39:42 AM
Subject:	FW: thoughts on PPT
Attachments:	Baker_CCD Presentation_5_14_2013_SO.pptx

From: Ohrel, Sara
Sent: Tuesday, May 14, 2013 9:04 AM
To: 'Baker, Justin'
Subject: thoughts on PPT

Hi Justin,
Here are a few minor comments/edits. Happy to discuss.
Thanks!

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Phone: (202) 343-9712
Cell: (202) 341-6748

From: Baker, Justin
To: Ohrel, Sara
Sent: 5/13/2013 10:31:02 PM
Subject: Baker_CCD Presentation_5_14_2013.pptx
Attachments: Baker_CCD Presentation_5_14_2013.pptx

Hi Sara,

Here is a start. I'll add the data and fill in holes in the morning on the plane/train. Please feel free to add anything and we can compile tomorrow.

Thanks,
Justin

From: Sherry, Christopher
To: Jenkins, Jennifer; Ohrel, Sara; Epanchin, Pete
Sent: 5/10/2013 5:24:19 PM
Subject: RE: next draft of AF2
Attachments: AF2 main body clean no_comments 5 8 2013_sk5-9_CS.docx; EXECUTIVE SUMMARY 5 8 2013_CS (Clean)_SO_CS(rev).docx

Attached are my comments on Section 1. It includes my edits, as well as attempts to be responsive to Suzie's edits. I wasn't bashful about deleting text – we probably describe what the framework is intended to do 10 different times in this section, in different ways. In places we are also trying to be comprehensive, in ways that interrupt the flow.

Feel free to accept or reject my changes as you see fit.

Also, I have attached a slightly modified version of the Executive Summary, to align with Suzie's edits on the Intro, and a few other tweaks of mine.

Chris

From: Jenkins, Jennifer
Sent: Friday, May 10, 2013 11:48 AM
To: Sherry, Christopher; Ohrel, Sara; Epanchin, Pete
Subject: Re: next draft of AF2

Cool. Edit away! And thanks!

From: Sherry, Christopher
Sent: Friday, May 10, 2013 11:45:40 AM
To: Jenkins, Jennifer; Ohrel, Sara; Epanchin, Pete
Subject: RE: next draft of AF2

I figured we can always merge (or you all can review before merging) – I've yet to read through the full draft, and won't have time to if I wait until next week.

From: Jenkins, Jennifer
Sent: Friday, May 10, 2013 11:43 AM
To: Sherry, Christopher; Ohrel, Sara; Epanchin, Pete
Subject: Re: next draft of AF2

Thanks Chris --

That's great. Do you think we should start editing now in response to these comments or wait for Bill to review?

From: Sherry, Christopher
Sent: Friday, May 10, 2013 10:04:03 AM
To: Jenkins, Jennifer; Ohrel, Sara; Epanchin, Pete
Subject: FW: next draft of AF2

As I have most of today free, I will take a read through and add any edits/comments to this version.

From: Kocchi, Suzanne
Sent: Thursday, May 09, 2013 6:21 PM

To: Fawcett, Allen; Irving, Bill; Jenkins, Jennifer
Cc: Epanchin, Pete; Ohrel, Sara; Sherry, Christopher
Subject: RE: next draft of AF2

All- Here on my comments on the report as whole. I want to echo Allen's sentiment that this is much improved. I have a lot of comment bubbles (which I know I complain about because edits are more helpful) but mainly it is just to ask a question because I wasn't sure about something and therefore couldn't suggest an edit. My main focus was on just general flow and readability and therefore most of my comments are related to things that seemed out of place/didn't flow right. I am hoping it is a matter of some fairly straightforward deleting or quick editing rather than a lot of reworking. I do not think it needs a lot of reworking – just simplifying.

Bill is going to put his edits on top of mind but since we are both out tomorrow I wanted you to see mine and so you could start working where it is easy if Bill is going to be later than cob tmrw.

Good job everyone. It is getting close!

Have a good weekend – Suzie

From: Fawcett, Allen
Sent: Thursday, May 09, 2013 3:51 PM
To: Irving, Bill; Jenkins, Jennifer; Kocchi, Suzanne
Cc: Epanchin, Pete; Ohrel, Sara; Sherry, Christopher
Subject: RE: next draft of AF2

Here are my comments on the baseline sections. Thanks for all the edits to the last draft, this is much improved.

Allen

From: Irving, Bill
Sent: Thursday, May 09, 2013 10:59 AM
To: Jenkins, Jennifer; Kocchi, Suzanne; Fawcett, Allen
Cc: Epanchin, Pete; Ohrel, Sara; Sherry, Christopher
Subject: RE: next draft of AF2

All – thanks. Suzie is reviewing the entire front section first, and then I will work off of her edited version. In parallel, Allen will be reviewing baseline text in the front section as well as the relevant appendices.

Bill

From: Jenkins, Jennifer
Sent: Wednesday, May 08, 2013 9:47 PM
To: Kocchi, Suzanne; Irving, Bill; Fawcett, Allen
Cc: Epanchin, Pete; Ohrel, Sara; Sherry, Christopher
Subject: next draft of AF2

Bill, Allen, and Suzie:

Attached please find three versions of the next draft AF2, for your review. I am attaching all three so that you can decide which version you'd like to read this time around -- the tracked version is messy, but might be helpful to see the edits we made in response to your previous review. The "clean with comments" version has the line edits accepted, but retains the comments, and the "clean" version has neither line edits nor comments.

A couple of notes:

Ex. 5 - Deliberative

Ex. 5 - Deliberative

We look forward to your comments, and we thank you for your review.

best
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Epanchin, Pete
To:	Ohrel, Sara; Jenkins, Jennifer; Sherry, Christopher
Sent:	5/8/2013 12:08:09 PM
Subject:	RE: Next draft of main body of text
Attachments:	AF2 main body with_comments_MERGED 5.6.13_CS_PE.docx; executive summary_track change copy.Do not use.docx

Hi Sara,
Here are my sections, input into Chris's latest version.
The executive summary is complete. While most of the ES is new text, I have attached a track changed version of it as a FYI (please make any edits to the ES in the main document, "AF2 main body with_comments_MERGED 5.6.13_CS_PE")
Part "6" (actually Part IV) Applying a Biogenic CO_2 Emissions Accounting Framework is still in the works. When you finish incorporating your comments, please send it back to me and I will add in the rest for this section.
I also made a few editorial comments & changes to Part I as well.
-Pete

Pete Epanchin, Ph.D.
AAAS Science & Technology Policy Fellow
US Environmental Protection Agency
Office of Air & Radiation
Office of Atmospheric Programs
Climate Change Division
Climate Policy Branch
202-343-9598

From: Ohrel, Sara
Sent: Wednesday, May 08, 2013 11:07 AM
To: Epanchin, Pete; Jenkins, Jennifer; Sherry, Christopher
Subject: RE: Next draft of main body of text

Thanks Pete. Are you working off Chris' version? I will need it by 1230 to merge to send by 1pm.

From: Epanchin, Pete
Sent: Wednesday, May 08, 2013 10:59 AM
To: Jenkins, Jennifer; Sherry, Christopher; Ohrel, Sara
Subject: RE: Next draft of main body of text

Hi.
I didn't see this email until this morning, though I was working on the document when you sent your email, Jen.
I will add the executive summary section. Still working on Part "6". There are some areas in that text that will still need work.
Sara when will you be ready to take the document? I won't send it until then.
-Pete

From: Jenkins, Jennifer
Sent: Tuesday, May 07, 2013 8:09 PM
To: Sherry, Christopher; Ohrel, Sara; Epanchin, Pete
Subject: RE: Next draft of main body of text

Thanks Chris!

All: this seems like a good time to regroup on the edits we're preparing for Bill/ Suzie/ Allen for tomorrow COB/ Thursday OOB.

I think Sara is working on the baselines and spatial scale sections, Pete is working on the Executive Summary and Bill's suggestions to Part 6, and Chris' edits here are for Part 5 and a few other pieces too.

I think Pete is planning to finish his pieces tonight, and Sara will be finished tomorrow noontime or so. Pete, is it possible to use Chris' version attached here to make your edits, and send them around tonight when you are done? Then Sara, can you use Pete's version to add your edits tomorrow morning so we can maintain something like version control?

I'll plan to review the whole thing again tomorrow night for the next draft to go to Bill/ Suzie/ Allen. I can get started on that after our 4:30-5:00 project management call.

Does anyone have thoughts on the placement of the feedstock-by-feedstock text, per Bill's suggestion for edits and my email from Sunday?

thanks!
Jen

From: Sherry, Christopher
Sent: Tuesday, May 07, 2013 5:37 PM
To: Ohrel, Sara; Jenkins, Jennifer; Epanchin, Pete
Subject: RE: Next draft of main body of text

Hey Team,

Attached are my revisions to the text describing the equation (Sec 5; pp. 40 - 57). I also had some comments on the baseline section (4.5 on pp. 35-39) and a few comments on p. 18 summarizing the equation. Didn't look at the other stuff -- sure its all awesome! ;).

Chris

From: Ohrel, Sara
Sent: Monday, May 06, 2013 9:04 AM
To: Jenkins, Jennifer; Epanchin, Pete; Sherry, Christopher
Subject: RE: Next draft of main body of text

The merge worked, so here is the latest document. The one small (and fixable) hiccup with merging is that comments doubled up. we just need to go through and delete redundant ones, though need to be careful when doing this as some have new comments added within a comment box. I started to fix this and got to page 17 and figured we can fix this when we work on our respective sections (as it is time consuming).
I will work from this version on the sections you have listed for me below, Jen.

Thanks!

From: Jenkins, Jennifer
Sent: Monday, May 06, 2013 8:46 AM
To: Epanchin, Pete; Sherry, Christopher; Ohrel, Sara
Subject: Next draft of main body of text

Team Biomass:

I have finished my edits on the main body of the text, up to the feedstock-by-feedstock section (Part IV, Section 4). Late last night, Bill sent his comments on the second half of Part V. Sara is merging the two documents so we have only one version again, and will forward that merged document soon…

Chris is out today because **Ex. 6 - Personal Privacy**, but plans to be in tomorrow.

In our effort to get the next draft to Bill/ Suzie/ Allen for a second read-through by COB Wednesday, in addition to reading through my edits, can you please focus on:

Sara – Can you edit the pieces of Part III Section 1 that you had started on: Ex. 5 - Deliberative
Ex. 5 - Deliberative
specific requests for your input.

Chris – On Tuesday, Can you handle Bill's request Ex. 5 - Deliberative
Ex. 5 - Deliberative

Pete –
a) Can you take a stab at revising/ editing the Executive Summary, started by Sara, using the ES from AF1 as a guide?
b) Then can you get started on making the suggested edits from Bill in Part V?

All – Bill wanted to see Ex. 5 - Deliberative
Ex. 5 - Deliberative

I know we were going to pass this back and forth Monday and Tuesday as you edit -- I'm not going to have much time Mon and Tues but can pick it back up on Wednesday.

thanks!
Jen

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
202-343-9361
jenkins.jennifer@epa.gov

From:	Ohrel, Sara
To:	Epanchin, Pete; Jenkins, Jennifer; Sherry, Christopher
Sent:	5/8/2013 3:14:03 PM
Subject:	main merged doc
Attachments:	AF2 main body with_comments_MERGED 5.8.13_SO_CS_PE.docx

Hi crew,
I merged PE/CS version from Pete with mine in the attached. I cleaned it up a little (deleting redundant comments due to the merge, odd sentences due to merge), but otherwise did not add comments/did not review new text (like the ES).

Ex. 5 - Deliberative

Thoughts?

Sara Bushey Ohrel
Climate Economics Branch
Climate Change Division
U.S. Environmental Protection Agency
Phone: (202) 343-9712
Cell: (202) 341-6748

From:	Ohrel, Sara
To:	Sherry, Christopher; Jenkins, Jennifer; Epanchin, Pete; Irving, Bill; Kocchi, Suzanne
CC:	Fawcett, Allen
BCC:	DCRoom1310L856p20PCPoly/DC-1310L-OAR
Sent:	5/6/2013 12:44:40 PM
Subject:	CONFIRMED: meeting with Joshua Martin from Environmental Paper Network
Attachments:	EPN-EPA-May7-2013.docx

When: Tuesday, May 07, 2013 3:00 PM-4:00 PM (GMT-05:00) Eastern Time (US & Canada).
Where: DCRoom1310L856p20PCPoly/DC-1310L-OAR

Note: The GMT offset above does not reflect daylight saving time adjustments.

~~*~*~*~*~*~*~*~*~*

Hi all,
Joshua Martin will be visiting us tomorrow. It seems per the attached memo he just sent me that he will be joined by Tyson Miller from the Green Press Initiative ("committed to advancing sustainable patterns of production and consumption within the U.S. book and newspaper industries and within the paper industry at large"; http://www.greenpressinitiative.org/) .

Here are the questions as outlined in the memo:
Below are some questions that I would like to discuss regarding the EPA's accounting framework and the three-year deferral (time permitting):
1. Is there any update on the timing of the process? Should we expect a public comment period this summer or fall on a final framework?
2. How is the EPA currently planning to address emissions from burning manufacturing byproducts in the forest products industry, including black liquor and wood waste?
3. Has the team at EPA determined if it will pursue an approach that goes beyond the smokestack and considers the landscape, or if it will interpret it as a statutory requirement of the Clean Air Act to limit permitting to smokestack emissions.

4. If the EPA proposes a framework and take a landscape approach, will it be including either (a) the estimated "opportunity cost" of forgone growth and carbon storage in the undisturbed forest or (b) Roger Sedjo's of RFF's proposed methods for accounting for forest expansion from market signals.
5. Assuming the research discussed above is sound, and the landscape carbon cost over a 40 year timeframe amount to something near to our results, how might that affect EPA's framework?
6. How can we create a policy that incentivizes efficiency and not just conversion energy that produces biogenic emissions no matter what the source. How can we create a framework and rule that doesn't justify bad policy like taxpayer subsidies for renewable energy portfolios going to pay paper mills to keep burning black liquor?

Environmental Paper Network

16 Eagle Street, Suite 200
Asheville, NC 28801
environmentalpaper.org

To: Sara Ohrel, US EPA - Climate Economics Branch
From: Joshua Martin, Environmental Paper Network
Date: May 6th, 2013
RE: Meeting on May 7th, 3:00 pm including Tyson Miller, Green Press Initiative

Thank you for the opportunity to meet with you regarding the three-year deferral and scientific review of biogenic carbon emissions accounting according to obligations under the Prevention of Significant Deterioration (PSD) and Title V Operating Permit Programs of the Clean Air Act.

As you know, the Environmental Paper Network is a coalition of the leading conservation organizations in North America working together towards a Common Vision for transforming of the pulp and paper industry. (www.environmentalpaper.org)

The conservation community asked the EPN to create a project to facilitate a diverse dialogue among ENGOs with the common goal of assuring accurate science is applied to the final outcome of the EPA's three-year deferral process.

We also have our own research initiative which is investigating the question of whether Life Cycle Assessment (LCA) can and should make an assumption of carbon-neutrality for its wood inputs. This initiative has recently completed a study under review at a leading academic journal.

Quick overview of research

A research project was completed by forest ecologist Dr. Donald Sachs, a forest research consultant who specializes in forest stand and landscape modeling and holds a PhD from Oregon State University. It follows on rationale previously presented by Tim Searchinger and others of a critical carbon accounting error which results in flawed LCA's and flawed policy. (***Science*** *Vol. 326, October 23, 2009)* It makes a set of assumptions that are very reasonable, and avoids highly speculative or uncertain variables to model, *"Forest Landscape Carbon Accounting in Three Regions of North America and the Implications for More Accurate Life Cycle Analysis of Paper Products."*

Our research identifies that current published LCAs of paper products do not capture the emissions from landscape carbon costs resulting from forest harvest nor do they count smokestack emissions, and generally assume carbon-neutrality. Using regional inventory data and modeling tools such as LANDCARB and COLE, landscape-level analyses were completed for forests in three distinct North American geographic regions (Boreal, Coastal Temperate, and Southeastern US). The results reveal how if we consider the opportunity cost of forgone growth (growth trajectory over time of an undisturbed forest), the landscape carbon cost of a decision to harvest and manufacture a paper product is significant across any time horizon.

When the results of this modeling are integrated with LCAs for paper products from kraft pulp, the resulting carbon footprint is elevated above previous published numbers which have never included this landscape carbon cost. And these elevated carbon footprints potentially lead us to new decisions in terms of policy, government incentive programs and responsible manufacturing and purchasing decisions.

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Landscape-level simulations for this project were performed with a standalone version of the web-based LANDCARB 3.0 model (Harmon 2012); a landscape extension of the earlier STANDCARB model (Harmon and Marks 2002). Figure 1, below, from the report (under review - not to be cited) illustrates the results of the modeling. The delta between the lines shows the opportunity cost of the decision/demand for normal harvesting across a managed forest landscape over that time. Note that the results are based on actually stand inventory data from the regions, not theoretical or uniformly mature stands at time zero.

Our report goes on to translate this information into its implications for Life Cycle Analysis, and finds that with all potential variation considered, the results indicate the emissions associated with paper production are higher than previous estimates which ignored the C costs associated with the forested landscape.

Below are some questions that I would like to discuss regarding the EPA's accounting framework and the three-year deferral (time permitting):

1. Is there any update on the timing of the process? Should we expect a public comment period this summer or fall on a final framework?

2. How is the EPA currently planning to address emissions from burning manufacturing byproducts in the forest products industry, including black liquor and wood waste?

3. Has the team at EPA determined if it will pursue an approach that goes beyond the smokestack and considers the landscape, or if it will interpret it as a statutory requirement of the Clean Air Act to limit permitting to smokestack emissions.

4. If the EPA proposes a framework and take a landscape approach, will it be including either (a) the estimated "opportunity cost" of forgone growth and carbon storage in the undisturbed forest or (b) Roger Sedjo's of RFF's proposed methods for accounting for forest expansion from market signals.

5. Assuming the research discussed above is sound, and the landscape carbon cost over a 40 year timeframe amount to something near to our results, how might that affect EPA's framework?

6. How can we create a policy that incentivizes efficiency and not just conversion energy that produces biogenic emissions no matter what the source. How can we create a framework and rule that doesn't justify bad policy like taxpayer subsidies for renewable energy portfolios going to pay paper mills to keep burning black liquor?

References

Harmon ME. (2012) The Forest Sector Carbon Calculator. Available at: http://landcarb.forestry.oregonstate.edu/default.aspx (accessed June 2012)

Harmon, M.E., and Marks, B. 2002. Effects of silvicultural practices on carbon stores in Douglas-fir – western hemlock forests in the Pacific Northwest, U.S.A.: results from a simulation model. *Canadian Journal of Forest Research* 32 (5):863-877.

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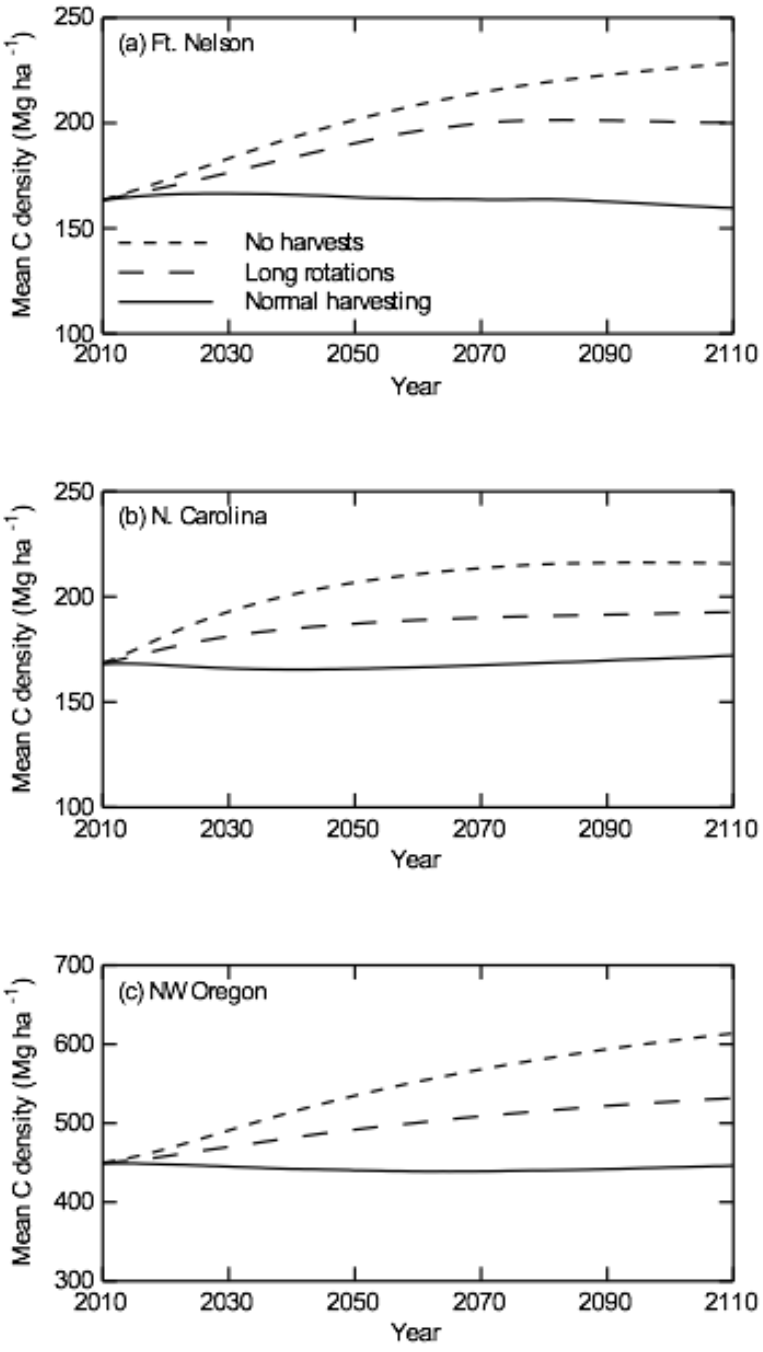

Figure 1. Comparison of trends in mean C density (Mg ha^{-1}) over three different 100-year simulations featuring normal harvesting, long rotations, and no harvesting in three test areas in (a) Ft. Nelson timber supply area of B.C., (b) State of N. Carolina, and (c) NW Oregon.

From: joshua.epn@gmail.com on behalf of Joshua Martin
To: Ohrel, Sara
Sent: 5/5/2013 2:14:24 PM
Subject: Re: biogenic carbon and visit to DC
Attachments: EPN-EPA-May7-2013.docx

Sara,

I look forward to meeting with you on Tuesday, May 7th, at 3 pm at the EPA office. Please find attached a memo in preparation for our meeting. Thank you,

Joshua Martin
Environmental Paper Network

Joshua Martin
Director | Environmental Paper Network
Call: 828/251-8558 x 1 (office)

Click here to read the Environmental Paper Network's latest newsletter.

On Thu, Apr 4, 2013 at 1:11 PM, Ohrel, Sara <Ohrel.Sara@epa.gov> wrote:

Thanks for checking in. No new documents or FRs on this subject as far as I know!

From: joshua.epn@gmail.com [mailto:joshua.epn@gmail.com] **On Behalf Of** Joshua Martin
Sent: Thursday, April 04, 2013 10:20 AM
To: Ohrel, Sara

Subject: Re: biogenic carbon and visit to DC

Thank you so much Sara, that all sounds good. Can you confirm for me that there have NOT been any more documents released or federal register notices about the accounting framework released recently? We had said that I would check in from time to time since its pretty hard to keep up with. Thank you very much.

Best,

Joshua Martin

EPN

On Thursday, April 4, 2013, Ohrel, Sara wrote:

Hello Joshua,

We can do 5/7 at 3pm. I have reserved a room here in our building, located at 1310 L Street NW. You should try to arrive early to go through security. Once you arrive, you can call or have the guard desk call my line (202 343 9712) and I will come down to escort you up. If you or any of your visiting colleagues are not US citizens, I will need additional personal information to get clearance for that person/persons to enter the building (new policy).

We look forward to seeing you,

Sara

From: joshua.epn@gmail.com [mailto:joshua.epn@gmail.com] **On Behalf Of** Joshua Martin
Sent: Tuesday, April 02, 2013 12:37 PM
To: Ohrel, Sara
Subject: Re: biogenic carbon and visit to DC

How about 3 pm on Tuesday 5/7? Where would be best to meet?

...and I realized that PSD is Prevention of Significant Deterioration and now I understand, thanks....

best,

Joshua Martin

On Tue, Apr 2, 2013 at 8:57 AM, Ohrel, Sara <Ohrel.Sara@epa.gov> wrote:

Great. Currently we can do Tuesday 5/7 after 2:30pm, Weds 5/8 at 10am or 11am, Thurs 930-10:30.

From: joshua.epn@gmail.com [mailto:joshua.epn@gmail.com] **On Behalf Of** Joshua Martin
Sent: Monday, April 01, 2013 7:15 PM
To: Ohrel, Sara
Subject: Re: biogenic carbon and visit to DC

Yes, on the accounting framework, thank you. We would like to meet if possible. I think I am confused as to what is the PSD acronym you are referring to.

Best,

Joshua Martin

On Monday, April 1, 2013, Ohrel, Sara wrote:

Hi Joshua,

Thank you for your email. We would be happy to meet with you during your visit to DC. However, to be clear, we will not be able to provide any regulatory updates or anything else related to PSD. If you have questions pertaining to either of those topics, we would not be the correct group to meet with. If you would like to discuss the accounting framework, then we are indeed the correct group. If you are still interested in meeting with us on the framework, I will work with my colleagues to arrange a meeting while you are here.

Best,

Sara

From: joshua.epn@gmail.com [mailto:joshua.epn@gmail.com] **On Behalf Of** Joshua Martin
Sent: Monday, April 01, 2013 10:45 AM
To: Ohrel, Sara
Subject: biogenic carbon and visit to DC

Hello Sara,

I hope you are well. I will be in the DC area the first week of May. Would you have any time available to meet with myself and a colleague anytime on May 7th, 8th or the morning of the 9th, regarding the biogenic carbon three-year scientific review? Thank you.

From: Ohrel, Sara
To: Jenkins, Jennifer; Sherry, Christopher; Epanchin, Pete
Sent: 5/1/2013 10:22:16 AM
Subject: RE: agenda for tomorrow's AF2 meeting

Thanks Jen – some suggested edits below!

From: Jenkins, Jennifer
Sent: Tuesday, April 30, 2013 3:03 PM
To: Sherry, Christopher; Epanchin, Pete; Ohrel, Sara
Subject: agenda for tomorrow's AF2 meeting

Team:

Here is a suggested agenda for tomorrow's AF2 meeting with Bill/ Suzie/ Allen: suggestions, ideas, comments welcome.

Ex. 5 - Deliberative

Jennifer C. Jenkins, Ph.D.
Climate Policy Branch
Climate Change Division, Office of Atmospheric Programs
US Environmental Protection Agency
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